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JOURNAL

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VOL. XXXIV. 1908.

PART I.

BULBOUS PLANTS IN NEW ZEALAND.

By EDWIN WHITE, F.R.H.S., of Kingsland, N.Z.

[Lecture read March 3, 1908.]

By way of preface to my remarks on the bulbous flowers of this beautiful island I would like it to be understood first, that I do not use the term bulbous in its strict botanical sense but include allied rhizomatous plants, and, secondly, that this paper only deals with those parts of the island comprised in the Auckland district and the district known as the "Waikato," about a hundred miles south. The latter district, though only about a quarter of a degree different in latitude, is considerably colder than Auckland, which is known as "the Corinth of the South," and during the winter months severe frosts occur, preventing the successful growth of many of the more tender varieties of plants. The soil of the "Waikato" is very variable. On a farm of one hundred acres on which I lived for a number of years almost every kind of soil could be obtained, from pure peat to heavy clay, and I look upon this district as an ideal one for the successful cultivation of almost all kinds of *Liliums*. These are very extensively cultivated, and may be seen growing in profusion without any care being taken of them; all the forms of *Lilium speciosum* and the various forms of *L. auratum* and of *L. elegans* may be seen in quantities in the various gardens dotted about the district. One family who came to New Zealand about twenty years since brought some *L. auratum*, and they have increased each year and bloom splendidly. The *Gladiolus* thrives admirably in this district, and I recollect seeing a large plantation of these charming flowers in a farm-house garden about thirty years ago which would delight the eyes of many modern gardeners and enthusiasts; but these flowers have gone out of favour of late years, and, except where grown by some ardent admirer, are not seen in such profusion as formerly. This is probably due to some extent to the difficulty that is experienced in perpetuating the better

varieties ; they do not appear to revert to the old type, but the finest of them fail to produce offsets, while some of the poorer ones multiply so rapidly that they gain full possession of the ground.

The most popular bulbous flowers of the day are undoubtedly the Narcissi ; and they may be grown successfully almost anywhere. Soon after coming to New Zealand I was walking along the sea-shore a few miles from Auckland, and saw some of the finest double Narcissi I have ever seen growing in a grass meadow where had formerly been a mission station ; they grew there for a number of years, but have long since disappeared. Great changes have taken place in horticultural matters since that time, and now growers of these flowers may be counted by the hundred.

Auckland and its environs may truly be said to be a horticulturist's paradise, but the conditions here are also greatly varied, more perhaps in respect to the soil than temperature. We find two distinct classes of soil, one of which is heavy clay and forms the true soil of the district ; the other is volcanic and overlies the heavy soil in those localities where volcanic action took place. The burnt lava, or scoria, as it is called, overspreads large portions of country, and in process of time has become decomposed, and forms a soil of variable texture, sometimes a light puffy material, which is liable to be blown away by the slightest breeze and sometimes a soil of a more adhesive character, while there are soils of all intermediate grades between the two. One peculiar feature of the soil is that, excepting in the volcanic districts, it is free from stone, which makes it much easier to work. Volcanic soil is peculiarly suitable for the growth of the various Narcissi, being warmer than the clay, and on this account most of the successful exhibitors at our spring show grow their flowers on this soil. But though the earliest they are not always the finest, as the flowers grown on the heavier land are, as a rule, when properly cultivated, of much greater substance, and more durable when cut.

A Daffodil conference has recently been held in Auckland, where the varied experiences of different growers were exchanged. Among other matters allusion was made to the length of time which was covered by the different varieties, and it was remarked by some who had seen a schedule of a Daffodil show in England that nearly all the varieties, both early and late, were exhibited at the one show, while here there is a difference of 7 or 8 weeks in the blooming of the early and late varieties.

Lilies are coming rapidly into favour with the Auckland flower lovers. They seem, however, rather peculiar in their requirements, and many will not thrive in the volcanic soil, as it is neither of the nature of peat nor of the firmer texture liked by the various members of this large family. I have been getting together a fair collection, and have now over fifty varieties, and have gone to some trouble to try to make them a success in my fairly heavy soil. I have made excavations and filled in the bottom with small pieces of pumice ; then, for those which require it, I have mixed a fair quantity of peat with the soil, and planted in this. Most of the bulbs which I have imported, if sound on arrival, have done well with me, while a friend who successfully cultivated many varieties while living two hundred miles north of Auckland now fails altogether with them on volcanic soil about two miles away.

Lilium auratum platyphyllum, *L. Henryi*, *L. Krameri*, *L. phillipense*, *L. leucanthum*, and several of the *elegans* section have done remarkably well with ordinary soil and cultivation. I had hoped to have been able to report the result of this year's growth, but, as this paper must be sent away in a few days, I cannot wait for the development of some of those which are somewhat idle. This is January, and most of the *elegans* have already bloomed well; I have now in flower *L. auratum rubro-vittatum*, *L. concolor*, and *L. Coridion*. *L. platyphyllum*, *L. Wittei*, *L. magnificum*, and *L. leucanthum* are doing well, and will make a great show in a few days.

Besides those already referred to mention must be made of the various species of *Iris*, all of which succeed well except *Iris Xiphioides*, which seems to die off after the first year's planting: *I. Xiphium* and many other bulbous *Iris*es make a great show and succeed well, while the rhizomatous *I. germanica* and *I. Kaempferi* give a magnificent display of flowers with scarcely any attention. The Japanese *Iris* is especially satisfactory, and, although usually said to require a moist or marshy situation, it seems to thrive as well with us when grown on very dry soil.

The different species of *Richardia* are extensively grown, and succeed remarkably well, *R. Elliotiana* especially. I saw a bed of this species, numbering about 200, during the blooming season. It was a truly magnificent sight. The roots are lifted early in the autumn and planted in early spring. This is not actually necessary except in heavy clay land, but growers on the lighter volcanic soils prefer to be on the safe side. I have grown the pink *R. Rehmannii* several seasons: it is rather dwarf in growth, but the true species is very pretty; it does not seem as hardy as some others, and must be lifted in autumn or it decays with the winter moisture.

Besides those already mentioned *Ixias*, *Montbretias*, *Tulips*, *Hyacinths*, *Amaryllis*, and *Sparaxis* are grown in great profusion out of doors, and another plant which is comparatively uncommon, *Elisena longipetala*, makes a great show with its curiously formed flowers; it does well outside and increases rapidly.

It will be noticed that allusion has been made only to exotic bulbs. I would have liked to have been able to deal with native plants which are less known to English horticulturists, but there but few bulbous plants of interest indigenous to this country, the native flora being of a very different character. Ours is, as one of our poets has sung, "the land of the Kauri and the Fern," and I have carefully searched the district for indigenous bulbous plants, but with little success. One, however, which is allied to the *iris* is particularly worth notice. It is *Libertia Ixioides*, a rhizomatous plant which has a very pretty flower and succeeds well under ordinary cultivation.

BEAUTIFUL FLOWERING TREES AND SHRUBS.

By GEORGE GORDON, V.M.H.

[Lecture delivered March 17, 1908.]

UNTIL within recent years one of the weak points in the formation and management of gardens has been the failure to appreciate the importance of the more beautiful forms of arborescent vegetation in the creation and improvement of garden scenery. As a result large numbers of gardens lack much of the beauty and interest they might possess. In a considerable number we find only trees that are plentiful in the hedgerows and woodlands, instead of trees of more moderate stature, remarkable for the beauty of their flowers or foliage, or distinguished by the elegance of their growth.

Not until a comparatively short time ago did owners of gardens begin to fully appreciate trees; therefore they did not study them, or collect them, or take any notice of them beyond that which all men take, because of their general beauty and welcome shade. With this general indifference it is not surprising that the more beautiful, rare, and expensive kinds were not planted except in comparatively small numbers.

In the park, and in the pleasure grounds, with so large an area as to afford abundant space for their development, elms and oaks and beeches are so grand, so overpoweringly beautiful, so deeply suggestive of the abounding wealth of Nature, that, though we see naught else, the mind is sure to be filled with worthy thoughts and graceful images.

But in gardens of a moderate size there is not room for forest trees; there is not space to allow of their full development without imposing a severe limitation on other plants, and thereby greatly reducing the diversity of form and colouring which constitute so great a charm in a well-planned and judiciously planted garden. Variety in habit, in leafage, and in flower is essential to the full enjoyment of a garden; and therefore trees and shrubs of moderate height and spread of branches, remarkable for the beauty of their flowers or foliage, or for some other attribute, are especially desirable.

It is now many years since I began to devote special attention to such trees and shrubs as are distinguished by the wealth and beauty of their blossom, and commenced to impress their claims upon planters. I was greatly perplexed to find that, although in botanic gardens and in nurseries largely devoted to trees and shrubs the finest kinds were plentiful enough, there was but little demand for them, and comparatively few were planted. I could not help feeling that these beautiful plants could not be well known to the owners of gardens generally, and some ten years ago I made such arrangements as would enable me to bring them prominently before the flower-loving community; and the results have more than justified my endeavour, for they have now attained to a high degree of popularity, and thousands are now grown where at one time a few dozens were

sufficient to meet the demand. We have some evidence of the change that has taken place, in the magnificent collections in pots that are annually shown at the spring exhibitions of the Royal Horticultural Society.

It might be said that in mild seasons trees and shrubs bearing attractive flowers may be had in bloom the winter through; and certainly some of those blooming during the winter are of much interest and considerable beauty. It would be interesting to refer to them, but to do this would occupy more time than is at my disposal. Moreover my object is not to show how an arboretum should be planted to ensure an adequate representation of kinds bearing attractive flowers, or to advise on the furnishing of gardens in which both climatic and soil conditions are especially favourable. What I am anxious to do is to direct attention to the more beautiful kinds that can be successfully cultivated under ordinary conditions and that produce their wealth of bloom at a time when the garden can be fully enjoyed even by those whose constitution is not of the strongest.

It will be convenient to commence by directing attention to the common almond (*Amygdalus communis*), one of the most beautiful of the spring-flowering trees, blooming at the end of March or early in April, according to the season and locality. There are several varieties, but the most desirable are the form with double pink flowers, and *macrocarpa*, which has large single light-pink flowers. The varieties of the sweet almond (*Amygdalus dulcis*) have much to recommend them, particularly *purpurea* and *pendula*, the former having deep rose-pink flowers and the latter being remarkable for its graceful habit of growth. Their near relatives, the double-flowered peaches, are not quite so vigorous as the almonds, but this is no disadvantage, and they can be planted in prominent positions in small shrubberies or in beds on the lawn, without any apprehension as to their size quickly becoming too great for their allotted space. The crimson, rose, and white are the best forms for general planting.

The almonds and peaches are followed very closely by the magnolias, and these are so beautiful, and so admirably adapted for gardens of all sizes, that I could wish to be able to say, in the words of Wordsworth, of all gardens—

The magnolia spread
High as a cloud, high overhead.

The magnolias are of such exceptional beauty in the garden that they should be planted by the dozen instead of in twos and threes. There are hundreds of gardens of considerable size in which they are wholly unrepresented, and very few appear to have been planted until comparatively late in the last century, for it is quite exceptional to meet with large specimens. The first to bloom is *Magnolia stellata*, an extremely beautiful species introduced from Japan about thirty years ago, and forming a neat bush ranging from three to five feet high. The flowers are starlike, with strap-shaped petals, pure white, and produced in great abundance during April. There is a variety (*M. stellata rosea*) with rose-pink flowers, and both this and the type should be

planted in all gardens. The Yulan (*M. conspicua*) is of pyramidal growth and forms a handsome tree, ranging from twenty to thirty feet high, and the flowers are large, pure white, waxy in texture, and produced in great profusion. *M. Soulangeana*, which originated from a cross effected between the Yulan and *M. obovata*, is about equal in stature to the Yulan, but has a rounder head. The flowers are equal in size and similar in form to those of *M. conspicua*, but they are richly suffused with rose-purple and produced even more freely. It would be impossible to exaggerate the surpassing beauty of these two trees when in full bloom. *M. conspicua* is the first to bloom, and is followed two or three weeks later by *M. Soulangeana*. Owing to the liability of the flowers to damage from frost it is an advantage to plant them where they will be sheltered on the east. There are several good varieties, and those which can be specially recommended to the notice of planters are *M. Soulangeana nigra*, which has deep-purple flowers, and *M. conspicua Alexandrina*, which blooms two or three weeks later than the type, and is less likely to have its flowers damaged by frosts. There is yet another deserving a place in every garden, and this is the extremely beautiful *M. Lennei* (fig. 1), which originated in France from a cross between *M. conspicua* and *M. obovata discolor*. The flowers are bright rose-purple, and much larger than those of either of the foregoing, and they are also considerably later in attaining their full development, and are practically immune from unfavourable climatic influences. There are several other deciduous species which should be planted where the pleasure grounds are spacious, and the handsome evergreen species *M. grandiflora*, which is usually grown against a wall, but in kind climates forms a handsome specimen for the lawn.

Of much value also on account of the early season at which they bloom are the Ornamental Currants and the Forsythias. Of the former, *Ribes sanguineum* and its numerous varieties are the most valuable for general planting, being profuse in blooming and effective in colour. There are three Forsythias that have claims upon the planter, and these are *Forsythia intermedia*, *F. suspensa* and *F. viridissima*. The first, which originated as a hybrid between the other two, is the best, and next in merit ranks *F. suspensa*. All have flowers of varying shades of yellow. A few weeks later the most useful of the numerous Barberries commence to yield their wealth of blossom: *Berberis Darwinii*, which bears a profusion of orange-coloured flowers, is very effective, and should be generally planted; but the most beautiful of all the Barberries is *B. stenophylla*. This is a hybrid between the foregoing species and *B. empetrifolia*, and is of elegant habit and very free in blooming, the rich orange-coloured flowers being borne throughout the whole length of the slender shoots.

The plums, which also bloom quite early in the spring, include a few trees and shrubs possessing considerable attractions. The double-flowered sloe (*Prunus spinosa fl. pl.*) is an extremely elegant tree, and is very beautiful when in bloom; but it is a tree for spacious pleasure grounds rather than for the small garden. The most beautiful of all the plums is *P. triloba*, which has rather large semi-double rose-pink flowers and blooms during April. It is admirably adapted for clothing sunny walls and for forming small groups on the lawn. The flowers are

produced on the growth of the previous season, and to keep the trees well furnished with young wood, and prevent their becoming "leggy," the flowering shoots should be cut back to the first or second bud from the base immediately the beauty of their flowers is past. The resulting shoots should be allowed to grow naturally during the summer and



[Photo: George Gordon]

FIG. 1.—A YOUNG SPECIMEN OF MAGNOLIA SPECIOSA.

to remain until after they have flowered. *P. sinensis fl. pl.* and *P. sinensis fl. pl. alba* are small shrubs bearing double flowers, which are pink and white respectively. The 'Snowy Mespilus' (*Amelanchier canadensis*) is a small-growing and extremely elegant tree, producing during the spring months a profusion of small flowers, but these,

unfortunately, do not long retain their beauty if the weather is wet or windy.

The crabs and cherries form two groups of outstanding importance, and it would be difficult to place too high an estimate upon their value in the creation of garden scenery. Chief among the apples are the varieties of *Pyrus floribunda*, for they possess an elegant habit and are remarkable for the freedom with which they bloom. The type has flowers that are bright crimson in the bud state and pale pink when fully expanded. The finest of the varieties are *atrosanguinea*, *Halleana*, and *Scheideckeri*, the last being especially meritorious. *P. spectabilis* has a more erect habit and forms a tree of considerable size. The flowers are large and of a rich pink hue. The Siberian Crab (*P. baccata*) is a handsome tree with roundish head and produces a profusion of pure white flowers. The White Beam tree (*P. Aria*) is pyramidal in growth and has greyish leaves, white on the under side, and produces clusters of white flowers that are followed by brilliant scarlet fruits.

Not less beautiful in their way are the double-flowered cherries. The single-flowered forms present a charming appearance when enwreathed in their snowy blossom, but the flowers soon shed their petals. There are two cherries of exceptional merit: one is *Cerasus Avium fl. pl.* (fig. 2), which has pure white double flowers of large size and is most profuse in flowering; the other is *C. pseudo-cerasus* 'J. H. Veitch,' a form bearing large double flowers of a pale lilac-rose, and so handsome when in bloom that it would be difficult to overestimate its merits for garden planting. *C. pseudo-cerasus* is less elegant in growth than the Bird Cherries and others of similar habit, but the wide-spreading branches give it a distinct character and the attractive flowers render it of considerable value. *C. pseudo-cerasus Watereri* is a handsome form, but not quite so effective in colour as 'J. H. Veitch'; but as *Watereri* blooms a fortnight or so earlier there is no occasion to institute comparisons between them. Planters will do well to take advantage of both. Another cherry that can be recommended for a suitable position in pleasure-grounds is *C. Mahaleb pendula*, which is, perhaps, of greater value for its elegant habit than for its flowers.

The brooms and other trees and shrubs belonging to the same natural order form a valuable group, because of the distinct shade of colour they afford. One of the first to bloom is the free-flowering *Cytisus praecox*, with sulphur-white flowers, and this in due course is followed by *C. scoparius Andreanus*, one of the most attractively coloured of the brooms, and *C. albus*, a white-flowered species of elegant growth. Of special value for spreading over banks and bold rockwork is *C. kewensis*, a hybrid obtained by crossing *C. albus* and *C. Ardoinii*, bearing large soft-yellow flowers. *Genista hispanica fl. pl.* is a dense-growing shrub useful on bold rockeries and in the margin of shrubbery borders, bearing a profusion of rich yellow flowers, where also *G. cinerea* may be used with advantage. The Spanish broom (*Spartium junceum*) is of bold growth, has bright-yellow flowers, is highly effective when in bloom, and of value for the long period over which its flower-production extends. Seedlings of the Laburnum should not be planted in the garden until they have flowered and have been found of high quality. The best course is to plant

a fine variety of the Common Laburnum, such as *Alschingeri*, and one of the Scotch Laburnum, as *Parksii* (fig. 8), because of the larger development of their racemes. Both the Common and Scotch forms should be represented, because of the difference in the period of flowering.



[Photo: George Gordon.]

FIG. 2.—*CERASUS AVIUM* FL. FL.

The thorns form suitable companions to the laburnums and other subjects flowering at the same time, and of the varieties of *Crataegus Oxyacantha*, the double pink, double white, and Paul's double crimson can be strongly recommended, as well as the single-flowered white weeping form. The tansy-leaved thorn (*C. tanacetifolia*) has pure white flowers, is very free in blooming, and valuable because of its season of flowering

being two or three weeks later than that of the varieties of *C. Oxyacantha*. There are several other good thorns which should have attention when those mentioned have become established, provided there is room for a wider selection.

The value of the lilacs has been considerably enhanced by the additions that have been made to them during the past twenty or thirty years. The best of the older forms have not, however, been surpassed,



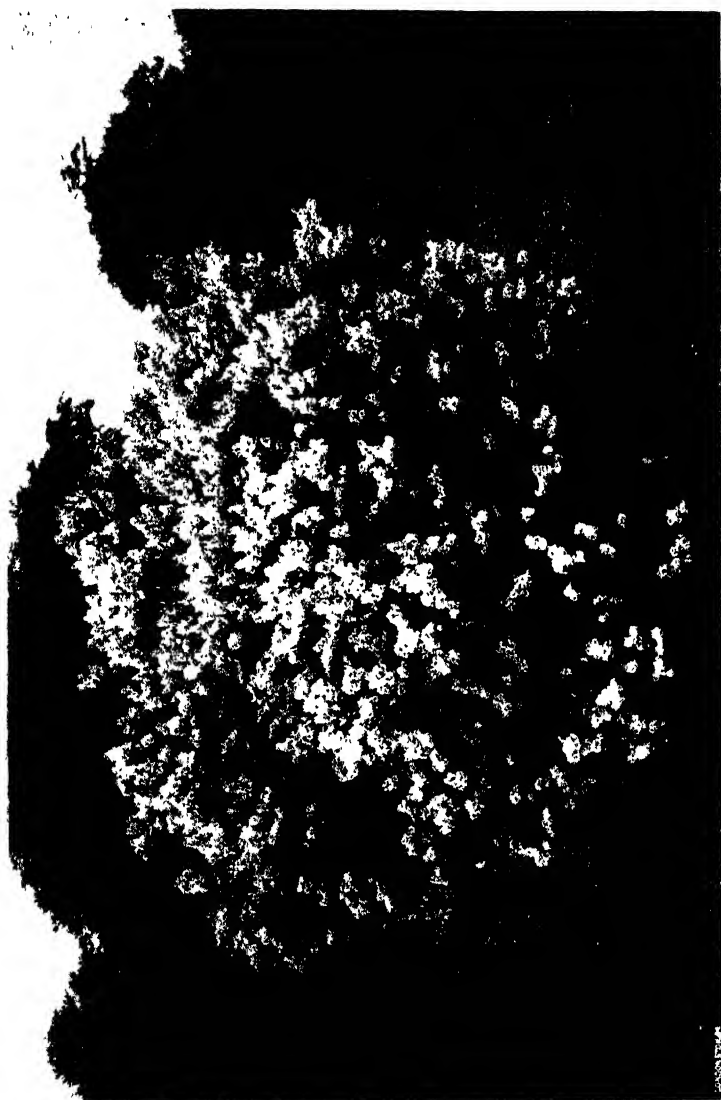
[Photo. George Gordon.]

FIG. 3.—SCOTCH LABURNUM (*LABURNUM ALPINUM PARKSI*).

and *alba grandiflora*, *chinensis*, 'Rubra de Marly' (fig. 4), *Louvainensis*, 'Charles X.', and 'Dr. Lindley' should be included in all selections of single varieties. To these may be added with advantage *coerulea superba*, 'Louis van Houtte,' 'Prince Notgen,' and 'Souvenir de Léon Späthe.' Of the double varieties 'Alphonse Lavallée,' 'La Tour d'Auvergne,' 'Madame Abel Châtenay,' 'Madame Lemoine,' 'Président Carnot,' 'Président Grévy,' and 'Virginité' may be mentioned as possessing much merit. The most important points in the cultivation of lilacs is

to avoid overcrowding and vigorously repress the suckers, the latter being particularly necessary in the case of the newer forms, which are grafted on the common lilac.

Spiraeas of shrubby habit that are sufficiently meritorious to justify their being extensively planted include *S. arguta*, *S. Bumalda*



[Photo: George Gordon.]

FIG. 4.—A WELL-GROWN LILAC, 'RUBRA DE MARLY.'

'Anthony Waterer,' *S. bracteata*, *S. pinnatifolia* fl. pl., *S. Van Houttei*, *S. ariaefolia*, and *S. Lindleyana*. Of quite exceptional value are *Viburnum Opulus sterile* and *V. tomentosum plicatum* (fig. 5); they are both admirably adapted for planting singly and for grouping in the shrubbery, provided they are not overcrowded, and for lawn groups. Of

the two the latter is preferable, but there are few gardens so small that both should not be included in them.

The species of *Philadelphus*, or mock orange, are all more or less beautiful, and they are especially useful since they flower at Midsummer. Some of the best of the strong-growing forms are *P. coronatus*, *P. Gordon-*

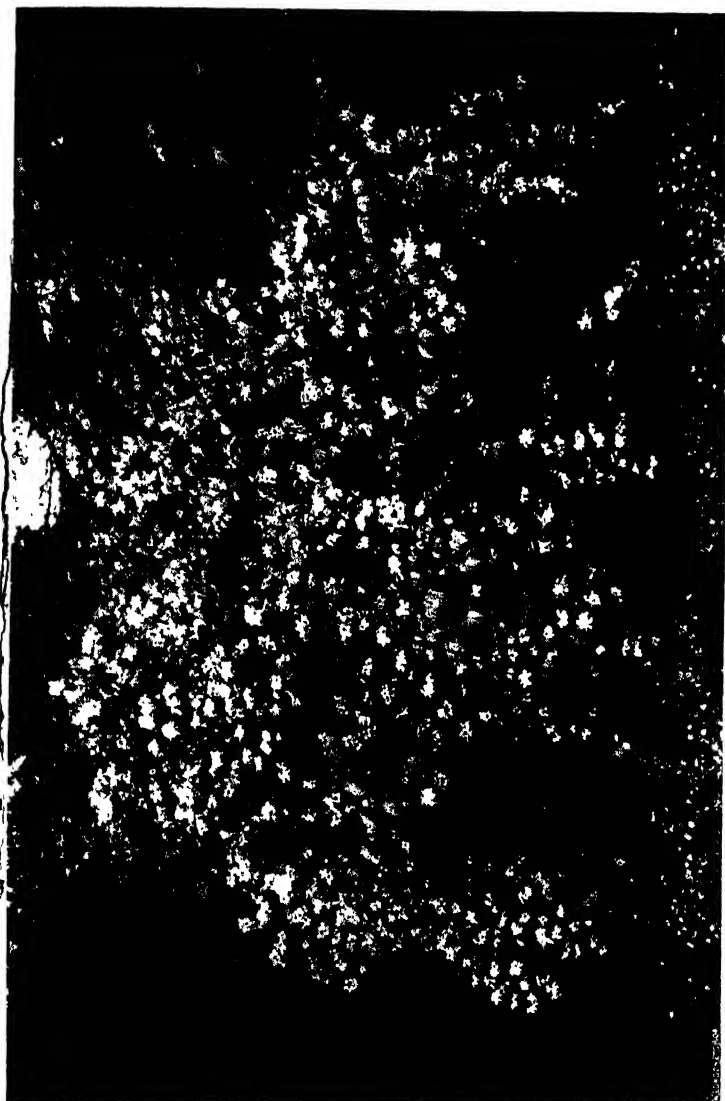


[Photo: George Gordon.]

FIG. 5.—VIBURNUM TOMENTOSUM Plicatum.

ianus (fig. 6), and *P. grandiflorus floribundus*; and of the smaller-growing hybrids *P. Lemoinei*, *P. 'Boule d'Argent'*, and *P. 'Gerbe de Neige'* should first have attention. Subjects of a more miscellaneous character that should be included are *Exochorda grandiflora*, *Hydrangea paniculata grandiflora*, and *H. vestita*, the latter a species but little known and very valuable for the wild garden; *Rubus deliciosus*, *Halesia*

tetraptera, *Styrax japonica*, *Carpenteria californica*, *Choisya ternata*, *Fremontia californica*, *Catalpa bignonioides*, one of the most beautiful of hardy trees flowering late in the summer, and the scarlet chestnut (*Aesculus rubicunda*), the best of the chestnuts for planting in the garden.



[Photo: George Gordon.]

FIG. 6.—PHILADELPHUS GORDONIANUS.

Azaleas and rhododendrons form such important groups that they should be well represented in both large and small gardens. It is not possible to refer to them otherwise than in the briefest possible manner. In the selection of rhododendrons the planter should not only select varieties bearing finely developed and effectively coloured flower trusses, but he should be careful that those selected have a neat habit and an abundance of leaves. With regard to the azaleas I have only time

to say that both the *mollis* varieties and the single and double Ghent varieties should be planted with some degree of liberality. With these the most delightful colour effects can be produced with but little trouble and at a comparatively small cost (fig. 7).

There are other classes of peat-loving plants that should be associated with the azaleas and rhododendrons, such as the *Andromedas* or *Zenobias*,



[Photo: George Gordon.]

TING OF HARDY AZALEAS.

the *Kalmias*, and the *Heaths*, where the available space is sufficient to admit of this being done. With the hardy heaths alone a most delightful feature may be formed, and it is a matter of some interest that these shrubs should have become popular, and that their systematic culture has made considerable advances within recent years.

THE HISTORY OF THE CABBAGE TRIBE.

By the Rev. Professor G. HENSLOW, M.A., F.L.S., V.M.H.

[Lecture delivered March 31, 1908.]

Brassica * *oleracea*, L. (*Cruciferae*), is a native of the coasts of England and Wales, the Channel Islands, and W. and S. Europe. It has no wild varieties, but innumerable sorts have arisen under cultivation. It supplies a nutritious diet from the roots, stems, and branches, as well as from the leaf-buds, leaves, and unexpanded inflorescences.

The origin of the name "cabbage" is as follows: In the sixteenth century the French name of the plant was *choulz*, "as if we wished to speak of the stems, Latin, *caules*, by which also *Brassica* is called by Cato, since scarcely any herb grows larger in the stem. The '*choulz cabuz*' are the most delicate for eating."† This appears to have been the popular French name for the *Crambe capitata* or "Cabbage cole" of Gerard. In modern French the first word is retained, so that *chou* alone signifies the cabbage; while in English this is dropped, and we have turned the second into cabbage (formerly spelt "cabbidge"). *Cabuz* is derived from *capus*, which meant in French "round-headed," being itself derived from the Italian *capuccio*, a "little head," a diminutive of *capo*, Latin *caput*.

Root.—The only instance of the roots being cultivated was a variety called *Napo-brassica*, first mentioned by C. Bauhin ("*Pinax*," 1671), and described as being like a carrot or turnip and cultivated in the colder parts of Bavaria, and especially on the mountains near Bohemia. It was called "Dorsen" or "Dorschen."

Tournefort described this, but only in the words of Bauhin, and makes no mention of its being grown in his day (1730).

Stem.—There are two forms of the stem in use; the most important is the Kohl-rabi (var. *Caulorapa*), remarkable for its globular form. It is not clear whether it was known to the ancients, but Pliny's description of the "Corinthian" turnip seems to agree with it. He says: "The root is all but out of the ground; indeed, this is the only kind that in growing shoots upwards, and not, as all the others do, downwards into the ground."

It appears to have been introduced into Germany from Italy about 1558, and into Tripoli about 1574. Dodoens, who figures five kinds of *Brassica*, omits it (1559); so also does Lobel (1576); but Dodoens, in his "History of Plants" (second edition, date?), says of No. 4: "It

* With regard to the derivation of the word *Brassica*, Hermann Boerhaave (1727) says it is from ἀνδ τοῦ βράζειν, Lat. *vorare* ["to devour"], *quia haec planta locum tenet inter herbas edules*, i.e., "because it holds a place among edible plants." But there is no such Greek verb. There is βράζειν, or βράζειν, "to boil," and βιβρώσκω, "to eat," as well as the word ἀναβρόζειν, from an obsolete verb, ἀναβρόχω, "to swallow" or "gulp down."

† *Le Re Hortensi Libellus*, by Carolus Stephanus, 1545.

beareth a great round knop like a Turnep, the which groweth right under the leaves, even hard upon the ground, and is white within, like a Turnep, and is even so drest and prepared to be eaten." This, presumably, was in Holland, about 1570.

Matthioli, in his "Commentary on Dioscorides" (1574), has a good figure of Kohl-rabi under the name *Brassica gongylodes*. He says it is cultivated in the gardens of Italy, and observes that the stem becomes tuberous, like that of the rape ("cujus caulis rapi in morem extuberat").

A very poor specimen is figured in the "Historia Plantarum," generally attributed to Dalechamp, printed at Lyon (Lugdunum). If anything can be inferred from it, it would seem not to have been much cultivated in France in 1586, for other and later figures are improvements.

Gerard separates this kind from the Colewoortes or Cabbage tribe as "Rape Cole," *Caulorapum rotundum*, and reproduces Matthioli's figure, adding a second, in which a few leafy shoots proceed from the axils of the leaf-scars on the tuberous stem. This being oblong instead of globular, he calls it *C. longum*, or Long Rape Cole.

He gives as the countries of cultivation Italy, Spain, and some places in Germany, omitting France. "They are accounted for daintie meate."

There is another kind of cabbage with a peculiarly formed swollen stem, being tapered at both ends, and called *Chou Moellier blanc*, or the "white Marrow Cabbage." *

"The Chou Moellier," Mr. Sutton tells me, "is used in France for cattle food, and both leaves and stems are employed for this purpose, the latter being chopped up. This is a favourite crop with some French farmers."

The stem swells to about four times the diameter at the base, then tapers again at the summit. The foliage is that of the wild plant. Pliny's description of the Pompeian cabbage seems to tally with this as to the stem.

The fact that the cabbage plant has a conspicuous and thick stem is the reason why *caulis* (Latin for a "stem") supplied the later name. Thus Turner observes (1547) that the English name was Cole or Keele, the Dutch *Kol*, the French *Chaulis*, and that the apothecaries of his day actually called the plant *Caulis*.

In a glossary of the fourteenth century called "Sinonoma Bartholomei" it is said that *Brassica* was the name before transplanting; afterwards, as a garden vegetable, it was called *Caulis*. This was the official name, corrupted into the English forms cole, coule, rede-coule, coole, and reed-worte, in the fourteenth and fifteenth centuries.

The Foliage.—The most important writer on the Cabbage among the ancients is Pliny. He commences his chapter on the varieties as follows:—"Cabbage and Coleworts, which at the present day are the most highly esteemed of all the garden vegetables, were held in little repute among the Greeks." But Cato, on the other hand, sings the wondrous praises of the cabbage. He distinguishes three varieties: the first, a plant with leaves wide open and a large stalk [the early Savoy Cabbage?]; a second, with crisped leaves, to which he gives the name of *apiaca* [curled colewort?]; and a third, with a thin stalk and a smooth, tender leaf, which

* Illustrations are given in present-day French catalogues.

with him ranks the lowest of all [not identifiable; probably near to the wild form].

"The best time for sowing them is at the autumnal equinox, and they are usually transplanted as soon as five leaves are visible. In the ensuing spring, after the first cutting, the plant yields sprouts, known as *cymae*. These sprouts, in fact, are small shoots thrown out from the main stem, of a more delicate and tender quality than the cabbage itself. After the *cymae* have made their appearance the cabbage throws out its summer and autumn shoots, and then its winter ones, after which a new crop of *cymae* is produced."

It has been suggested that *cymae* (or *cymata*, as Columella writes it) were vegetative buds developed as leafy shoots. If so, this would be just like the form now cultivated as the "thousand-headed kale," adaptable for sheep.

The various kinds named and described by Pliny are as follows: "(1) *Tritiana*; (2) *Cumanian*, with leaves close to the ground and a wide open head; (3) *Aricinian*, of no greater height, but with more numerous leaves and thinner (this last is looked upon as the most useful of them all, for beneath nearly all of the leaves there are small shoots thrown out, peculiar to the variety); (4) the cabbage of *Pompeii* is considerably taller, the stalk, which is thin at the root, increasing in thickness as it rises among the leaves, which are fewer in number and narrower (the great merit of this cabbage is its remarkable tenderness, although it is not able to stand the cold*); (5) the *Bruttum* thrives all the better for the cold, its leaves are remarkably large, the stalk thin, and the flavour pungent; (6) the *Sabine* has leaves crisped to such a degree as to excite our surprise, and their thickness is such as to quite exhaust [conceal?] the stem;† in sweetness, however, it is said to surpass all the others; (7) *Lacuturris* (i.e., "lake-tower"). They are grown in the valley of Aricia, where formerly there was a lake and a tower. The head of this cabbage is very large; there is no cabbage that runs to a larger head than this, with the sole exception of the *Tritiana*, which has a head sometimes as much as a foot in thickness, and throws out its *cymae* the latest of all." This is the most complete list we possess of the varieties in the first century of our era. We have to come to the sixteenth century for any new descriptions; and although some writers of that century, as Dodoens, still recognise the forms of his day as being comparable with Pliny's, the difficulty now of doing so is greatly increased though we find varieties of similar types. It would be rash to call them lineal descendants, as the same forms will arise afresh under similar conditions, as has occurred more than once when wild seed has been grown for experimental purposes in gardens.

The earliest attempt at an illustration of *Brassica oleracea*, L., that I know of is one in an edition of the "*De Herbarum viribus*" (1506), by Macer Floridus. He wrote his poem in 1140, and the first printed edition was issued in 1487 at Naples. The figure is suggestive of the wild plant

* The above description of No. 4 agrees remarkably with the *Chou moellier blanc*, described above.

† Bohn's translation has "exhaust." Not having access to the original Latin I do not feel sure as to the meaning, and suggest "conceal," as the stem is no longer visible, as in Sutton's "Al Kale."

or a kale, but certainly not of a cabbage. It is named *Caulis*, and the hexameter line referring to it runs—

Caulis romanâ, graecorum, Brassica linguâ.

Dodoens gives illustrations of five sorts of *Brassica* (1559), but the seed of the last was sold for that of rape, as he describes it as supplying oil for lamps, &c. He describes five sorts of "white" and five "black," including the rape, and identifies them as follows with Pliny's names:

No. 1. *Brassica sessilis et capitata*, corresponds with Pliny's (1) *Tritiana*.

No. 2. *Allobrogica* or *Sabaudica*, 'Choux de Savoy,' with a smaller and longer head, sweeter than the first, and impatient of cold. It is Pliny's (7) *Lacuturris*.

No. 3. *Cauliflores*, unknown to the ancients unless it be (4) *Pompeiana* or *Cypria*.*

No. 4. *Rapecaulis*, the kohl-rabi; perhaps Pliny's "turnip," as stated.

No. 5. *Patula*, "with crisp and rugose foliage; as it is much darker in colour, and approaches the *B. nigrae*, it is called *Negrecaulis* by the Italians."

Of the *Brassicæ nigrae*, "commonly called *rubra caulis*," Dodoens describes—

No. 1. *Patula*, "with very large leaves lying on the ground, on a short stem. This was Cato's *leia*, and agrees with Pliny's (2) *Cumanian*."

No. 2. "Another capitate form, but much smaller than Pliny's *Tritiana*. Perhaps it is his *Lacuturris*."

No. 3. "Foliage variously and doubly incised, like parsley. It is the *Selinoides* of Cato."

No. 4. "Excessively crisped foliage, usually called *B. crispa*; it is Pliny's *Sabellica*."†

In Gerard's "Herbal" (1597) there are fifteen figures of 'Coleworts' or forms of *Brassica oleracea*, L. They are interesting in showing something like the probable origins of the existing chief modern types in cultivation, from the slight modifications which arose in the wild form. This Gerard calls *B. marina anglica* or "English sea colewort." The sources of the cultivated forms can be detected in the original wild plant. Thus Hooker describes the stem as "very stout"; and, unlike the turnip, carrot, and radish, it does not produce a rosette of leaves on the ground, but at an elevation. Hence this *caulis* or stem at once distinguished it in the eyes of the early cultivators. As the lower leaves fall off the upper, with very short internodes, form a dense cluster at the top. In this we see the origin of the "head" of the cabbage. When the stem elongates, and the leaves are more scattered, it produces the kales. Below the lowest leaves Gerard figures a few globular buds. In his 'Perseley Coolewoort,' a kale with finely dissected leaves, the buds are represented as much more numerous. In them we may see the origin of our Brussels sprouts.

* There is nothing in Pliny's description to suggest this. As stated, it agrees better with the *Chou moellier*.

† Dodonaeus' (Rembertus) *De Stirpium Historia Commentariorum Imagines* (1559).

In his ninth figure of 'Cole Florie,' changed to-day into 'Cauliflower,' there is a very small group of little clusters of flower buds embedded in a large mass of foliage; in fact it occupies less than the twentieth part of it. If this represents the earliest form of the large cauliflowers we have now it is not surprising that Pliny knew nothing about it.

Great changes have taken place in the shape of the leaves. In the wild form Hooker describes the leaf of the wild plant as "obovate, lobed, and sinuate." There is a terminal, the largest, lobe, and from one to four pairs of much smaller ones below. To the enormous expansion of the uppermost lobe cabbages are due. "Sinuate" means having a "wavy" margin; in this one sees the origin of all the "crisped" forms, due to an immense increase, by hypertrophy, of the minute interspaces between the tips of the veins.

Hooker classes the cultivated forms under the following heads: *Acephala*, i.e., headless, the Scotch kale, cow cabbage, and borecole; *Bullata* and *Gemmifera*, Savoys and Brussels sprouts; *Capitata*, the red and white cabbages; *Caulorapa*, the kohlrabi; *Botrytis*, the cauliflower and broccoli.

Returning to Gerard's figures and comparing No. 1 with the wild plant, No. 15, the only difference we can see is that the lower part of the stem has retained its leaves, instead of becoming bare. This is the first result of cultivation and the beginning of some of the kales. The best modern form of this is seen in Sutton's magnificent 'A 1' kale; there is the crown of leaves at the summit, but the whole stem below is densely covered with leaves, the entire foliage being thoroughly crisped. The description is that of "curled sprouts." Though many of the leaves of the stem are retained the great mass of the foliage below the terminal branch is due to the development of the axillary buds, the leaves of which are *sessile* and much curled and crisped; not growing out into *shoots*, as in the "1,000-headed kale."

Gerard gives two other figures of kales in which leaves are retained almost to the root; and in these the stems have grown upwards so as to lengthen the internodes and prevent the rosette or head forming. The leaves in both are finely divided, so he calls them *Brassica selinisia*, the parsley colewort, and *B. selinoides*, fine-cut colewort. He says it was not much known, and he is the first to describe it. A form somewhat resembling these still appears as a "sport," but I am not aware of its being cultivated. However Gerard was wrong in saying that he was the first to describe the laciniate types; for two, called *Brassica crispa Tragi* and *B. tenuifolia racimata*, are figured in "Historia Plantarum," 1586.

Fig. 2, which Gerard calls *B. sativa crispa*, or 'Curled garden cole,' only differs from No. 1 in having a naked stem below and the leaves rather more cut and *very slightly* curled at the edges; the most primitive condition of the "crisped" forms of to-day.

Fig. 10 is another form of the last, having the whole margin strongly revolute. Gerard describes it as *B. tophosa* (apparently from a rough resemblance to pumice-stone); "the swollen Colewoorte of al other is the strangest; it came from Fraunce." One or two modern kinds certainly approximate to it. Thus Mr. Sutton writes me as follows: "I am

struck with the close resemblance of the plant [*B. tophosa* of Gerard] to two types of kale which are well known in the trade to-day. One is the *Chou palmier* of France, or palm-tree kale of England. [A bullated form, but not with the margins so much 'revoluted' as in *tophosa*.] The other is the Welsh tree kale, growing from four to five feet high, and producing an abundance of similar leaves up the stem with a pyramidal habit. The leaves of the Welsh kale much more resemble those of Gerard's picture, being very much curved back."

The Borecole, so called from the Dutch *boerenkool*, meaning "peasant's cabbage," is a hardy form of kale, with the leaves loose and much curled. It is apparently almost a crisped form of the wild cabbage; the foliage may be green or purple, or sometimes variegated with red and yellow colours, and then often used as a decorative plant. Varieties are known under the names of German greens, Buda kale, Scotch kale or curlies.

With regard to size, some have very tall stems, others stems of medium length, and others dwarf. Differences are noticed by later writers. Thus C. Bauhin,* describing one form of kale, says that it has been seen "as high as trees" at Florence. Tournefort describes a red colewort as being "taller than the other species; for it grows up with a high stock, two, three, or four foot, or even cubits, high, which is thick and of a dark purple colour, rugged on the lower part, sometimes single, and at other times branched out into arms . . . if well looked after it arrives to the height and firmness of a tree."†

We seem to see here something resembling our Jersey kales, of the stems of which walking-sticks are made. Gerard's figures thus illustrate a certain progression from the wild plant. The leaves become more wavy, then more dissected till the parsley-form is reached.

Crispness is next adopted in various degrees, among which the curious "*tophosa*" type occurred. It is this group wherein so great an advance in form and variety occurs at the present day. Those with leaves of slight departure from the wild plant, as Carter's Phoenix kale, might be mentioned, with erect foliage and broad terminal lobes. Then his *Chou de Russie* is a first step towards the more dissected parsley-type. The thousand-headed kale‡ has also a primitive type of leaf, but the stem buds are fully developed into shoots.

We now come to the true cabbage, with the leaves closing over one another, making the compact head; but before arriving at this stage we have to pass from the kales with spreading foliage. The first step is a great increase in the dimension of the terminal lobe till it becomes nearly circular. Even in the wild state it is often very large. In a leaf from a wild plant from the chalk cliffs at Walmer the terminal lobe is 9½ inches long by 7 inches in breadth. It has only one deep indentation, reaching within one inch of the midrib.

Gerard's third figure, of the Red Colewoort (*B. rubra*), has broader leaves, which form a denser cluster, but still spreading. This may have been the origin of our pickling cabbage. The next figure, No. 4,

* *Pinax*, p. 111 (1671).

† *The Compleat Herbal*, vol. i. p. 429.

‡ A better name, perhaps, would be 'Thousand-shooting' kale.

B. capitata alba, the White Cabbage Cole, is the first he recognises as a true cabbage, but the leaves are more *erect* and still loose. He says of these two, No. 3. "The red kind of Colewoort is likewise a Colewoort of the garden, and differeth from the common in the colour of his leaves, which tende vnto rednesse, otherwise very like No. 4. There is also founde a certaine kinde heereof with the leaues wrapped together into a rounde head or globe, whose head is white of colour, especially toward winter, when it is ripe."

Fig. 5 is called *B. patula*, or Open Cabbage Cole. The leaves are represented as quite circular; but, as Gerard says, "when it cometh to the shutting up or closing together, it rather dilateth it selfe abroad than closeth al together." As the object of the cultivator is to make his cabbages form a "heart" this form has probably disappeared.

The genuine hearting cabbage is represented by Gerard's fig. 5. It is "lesser than the white cabbage, and the colour of the leaves is of a lighter red than those of the former" (No. 4). Gerard gives two figures of the Savoy Cabbage, now known botanically as *B. oleracea bullata*; but this character of bulging between the meshes of the ribs and rims is neither figured nor alluded to, so that it is probably a later production. He figures them as having round leaves, but very "open," thus describing them:

Fig. 11, *B. sabauda*, "Sauoie Cole. The leaues are greet and large, verie like to those of the great Cabbage, which turne themselves vpwardes as though they woulde embrace one another to make a loued Cabbage; but when they come to the shutting vp they stande at a staie, and rather shewe themselves wider open than shut any neerer together; in other respects it is like vnto a Cabbage." In this respect, therefore, it resembles an intermediate stage between kales and the hearting or headed cabbages of to-day.

Messrs. Sutton have developed a bullated form of Kale, called the "Palm-leaved Kale," which might represent the preliminary stage towards the Savoy Cabbage, the leaves spreading, like those of a palm tree, and not incurved.

Fig. 12 is *B. s. crispa*, "Curled Sauoie Cole," which only differs in having a slightly curled margin.

The present-day description of the Savoy as given in the "Treasury of Botany" is that it is "chiefly distinguished by its leaves being wrinkled in such a manner as to have a netted appearance. When fully headed it forms an excellent hardy winter vegetable." Hence the Savoy differs now from Gerard's in having a central heart, a "bullated" surface, and often a crisped margin.

The varieties of true "hearting" cabbages are now innumerable, and it would be useless to enumerate them. Some are suitable for cattle and more for domestic purposes. Messrs. Carter alone have nearly forty varieties of red, white, and Savoy cabbages.

When globular buds are produced they can be borne on the stem in the axils of the leaves or leaf-scars, and only a rosette of leaves on the top, giving us the ordinary Brussels sprouts. The top may be replaced by many buds, as occurred in 1787, or both may be combined, a true cabbage being borne with sprouts below. This is Messrs. Carter's new

Cabbage-sprout, the result of a hybrid between *Winningstadt* Cabbage and *Cambridge Champion* Brussels Sprout.*

The curious proliferous form mentioned above was described in 1787.† It is called *B. capitata polycephalos*. In size it resembled ordinary cabbages, but differed in bearing several heads (sometimes fifty, the size of eggs, according to Tournefort), some larger, some smaller. It was thought to have resulted from extra nourishment. It is said to be an unaccustomed and rare form. There is no evidence of its having had any descendants, and Mr. A. Sutton writes that at the present day "there is no variety or strain of cabbage which produces an abundance of small cabbage heads; but we have often seen plants somewhat like your description [of the *polycephalos*], where the first head of the plant in a young stage has been injured, either by the hoe or by insects."

Brussels sprouts are so called from the fact that they originated in Belgium and have been long cultivated there. They were brought to England about the middle of the last century, and are characterised by the production of numerous buds in the form of miniature cabbages in the axils of the leaves all along the stem, instead of making a single large head at the summit. In six of Gerard's figures he shows a few buds occurring on the otherwise bare stem. Such foreshadow the possibility of their development into the modern form.

In ordinary Brussels sprouts the globular buds are produced without the leaves on the stems; but Mr. James Carter developed a form in which the leaves were retained, covering the stem in an erect manner. It was called 'Chou de Burghley,' but "it was not constant, and sometimes ran into all sorts of other types."

Gerard figures also "*B. prolifera*, Double Colewoort, No. 7, and *B. p. crispa*, the Double Crispe Colewoort." His description of the former is: "The Double Colewoort hath many large and great leaues, wherupon do grow heere and there other small iagged leaues, as it were made of ragged shreds and iaggies set vpon the smooth leafe, which giueth shewe of a plume or fanne of feathers." The other variety only differs in having "intricately curled leaues, and so thick set ouer with other small cut leaues, that it is hard to see any part of the leafe it selfe, except yee take and put aside some of those iaggies and ragged leaues with your hande."

He does not say whether these proliferous sorts were cultivated, but such outgrowths from the ribs on the under side of the leaves are not at all uncommon. They sometimes take the form of funnels on long stalks.

Messrs. Carter inform me that "there is a kind of borecole cabbage grown for the Paris markets at the end of winter called Bricoli Cabbage; we fancy we have noticed the crested growth you mention coming from the back of the ribs of this variety."

Inflorescence.—The broccoli and cauliflower supply globular masses of hypertrophied inflorescences, the flowers being in bud, the name implying "flowers of the stem" (*caulis*). It is known as "chou-fleur" in French, broccoli being the Italian name, from *brocco*, a "shoot"; for the

* Catalogue, 1907, p. 21 (figure and description).

† *Historia generalis plantarum*, p. 521. Attributed to Dalechamps.

primitive type was probably not a compact mass but a bundle of shoots, as occurs in the Maltese broccoli to-day. Gerard's figure, described above, is a very primitive form of the modern massive head.

"The sprouting or asparagus broccoli represents the first form exhibited by the new vegetable when it ceased to be the earliest cabbage, and was grown with an especial view to its [flowering] shoots. After this, by continued selection and successive improvements, varieties were obtained which produced a compact white head, and some of these varieties were still further improved into kinds which are sufficiently early to commence and complete their rustic growth in the course of the same year. These last-named kinds are now known by the name of cauliflower." *

With regard to the two principal modern forms of sprouting broccoli, Mr. Sutton writes: "The White Sprouting Broccoli" has been known as such for at least fifty years, and is carefully selected year by year to the best type. Purple sprouting broccoli, on the other hand, may or may not have been developed from the old 'Purple Cape' broccoli; but in habit of growth it more resembles a closer, more compact form of the thousand-headed kale, the edges of the leaves being serrated, and the plant much branched, the small purple heads eventually developing into flower buds."

The "heads," as sold in Malta, appear to be more like a degenerate form of English broccoli, as they are not round and compact, but loose and in spikes, without bearing leaves, whereas our sprouting broccolis are derived from the lateral leafy shoots of the stem (as in thousand-headed kale), but terminate in an inflorescence. The earliest notice of this variety appears to be in Miller's "Dictionary," 1724, where it is called the 'Sprout Colliflower.' It seems to have originated in Italy. Being sown in September there, as in Malta, it is cut in April or May.

The *Cauliflower* was earlier known, being mentioned by Dodonaeus—1553 or 1559—and figured by Gerard, 1597, though it was rare in Parkinson's time, 1629.

As illustrating the origin of the many varieties of *Brassica oleracea* by cultivation, Professor Buckman raised varieties from the seed of wild plants collected from Llandudno, "some having short petioles and the close-hearting condition of cabbages, both green and red, the tendency [to vary] being much increased by repeated transplanting. Others, with longer petioles and lyrate leaves, seem to take on the looser method of growth of kales, &c." With reference to persistency of form, Professor Buckman adds: "It may be remarked, as throwing some light on the nature of the changes by which the cultivated varieties of this genus have been attained, that experiments with seeds of plants showing any particular tendency, and especially if repeatedly grown in the same soil, will ever result in an increase of the same peculiarity." †

* *The Vegetable Garden*, 1885, p. 95.

† *Treasury of Botany*, s.v. *Brassica*.

HARDY CACTI AND OTHER SUCCULENTS.

By E. A. BOWLES, M.A., F.L.S., F.E.S.

[Lecture delivered April 14, 1908.]

WHEN I undertook to lecture upon the Cacti and other succulent plants that had proved hardy here in Middlesex on a specially constructed bank of my rock-garden, I thought the size of my collection and the healthiness of the plants warranted my so doing.

Then came one of the most destructive winters I have ever experienced in the garden. Bitter winds with sharp frosts—as much as 26 degrees one night—and a cold spring, after the sunless cool summer of 1907, have between them decimated the ranks of my Cacti. The ground was cold and damp so early in the autumn that I believe the roots of many rotted away instead of drying up when I put on the overhead lights in November.

I have in consequence a long list of the slain to read to you, and this afternoon's meeting partakes so much of the nature of a memorial service that I feel somewhat chary of giving any advice as to the cultivation of these plants for fear you will class me with the good lady who, resenting a kindly hint from a district visitor upon the management of her babe, answered, "Me not know how to bring up children indeed! Haven't I buried twelve of 'em?"

Two wheelbarrows full of rotten pieces of Cacti are, then, my qualifications for addressing you.

There are, of course, many succulent plants, such as the Sedums and Sempervivums of northern latitudes, that are absolutely hardy in Britain; but I wish to speak of kinds that are generally considered tender and more fitting for greenhouse cultivation than for the open air.

It is, I think, twelve years since I began growing a few *Opuntias* on a raised bank of the rock-garden. They flourished so well that I extended the bank, building it up with special drainage to suit xerophytic plants.

It lies facing due south, and is backed by a hedge of evergreens, and I placed a layer of brick rubble and coarse gravel of about the depth of 18 inches under the soil throughout, constructing gullies to carry off the rainfall, and placing drain pipes, leading into these gullies, in some parts.

The soil is chiefly turfy loam mixed liberally with old mortar rubbish, silver sand, sandy peat, and some well-weathered cinders from the furnaces.

I consider that, provided the plants are well watered in very hot weather, and fed with a little guano during their early growing period, the general soil cannot be too light or too poor for these Cacti.

I keep some glazed lights, from an old vinery, on purpose for covering this Cactus bank in winter. They are placed overhead from November to April, resting on posts driven into the ground, but having the sides open to the air. In ordinary seasons the early part of November is sunny

enough to allow this bank to become quite dry, and the plants shrivel a little, and thus are ready to withstand the cold of our ordinary winters.

Many of the Cacti are so beset with barbed spines that they are terrible to handle. Gloves are worse than useless, for the spines penetrate them and enter the flesh of one's hands ; and in removing the gloves the greater



[Photo. J. James.

FIG. 8.—*OPUNTIA CAMANCHICA* VARR.

portion of a spine is broken off, leaving the barbed end buried, very hard to see, and often exceedingly painful.

I arm myself, for attending to these spitefully ungrateful plants, by donning a pair of wicker cuffs, and I find a couple of long-handled steel forks, known as "Cook's forks," one in each hand, very useful for extracting weeds or rotten pieces of Cactus. In planting a large specimen I use

a small pair of tongs, such as one puts on coal with, to hold the plant and place it in position. Even with these careful preparations I seldom escape without a few spines in my hands.

Considering the trouble, are they worth growing? I think so, for I greatly admire their strange beauty of form, the symmetry and beautiful arrangement of their protective spines. I know many people think them only bizarre, or even positively ugly. But if only they could carefully examine a few, and note how we have, by gradual transitions, every stage of development, from the leafy *Pereskias*, with slender cylindrical stems bearing a few spines, through the almost leafless and spiny *Opuntias*, to the melon-shaped and ridged *Echinocactus* and *Cereus* forms, their dislike would turn to admiration.

The flowers are often of the most brilliant colours, and in the genus *Opuntia* the anthers are sensitive, and close when touched in a somewhat spiral manner, reminding one of a sea-anemone seizing food, and many kinds freely produce handsome red fruits that remain for two years on the plant. So that I find them attractive and interesting at all seasons.

The following list of varieties I have tried, under the condition described above, may be helpful to any wishing to grow similar plants.

In many cases where the plants have not flowered I have had no opportunity of verifying the names; so I give those under which I received the plants. Those marked * have flowered.

Opuntias in good health now.

	Year when planted.
<i>Opuntia arborescens</i>	1897
<i>arenaria</i> *	1900
var. from Colorado	—
<i>barbata</i>	1901
<i>Beckeriana</i>	1903
<i>bicolor</i> *	1901
<i>brachyarthra</i>	1900
<i>cantabrigiensis</i>	1902
<i>camanchica</i> * (fig. 8)	1897
var. <i>major</i> *	1900
<i>minor</i>	—
<i>albispina</i> *	1897
<i>lutea carmineo-staminea</i>	1902
<i>longispina</i> *	—
<i>orbicularis</i> *	—
<i>pallida</i> *	—
<i>rubra</i>	1901
<i>rosea</i>	—
<i>salmonca</i>	—
<i>fragilis</i> *	1900
var. <i>caespitosa</i>	1902
<i>tuberiformis</i>	—
<i>horizontalis</i>	1903
<i>humilis</i>	1899
<i>hystrixina</i>	1903

	Year when planted.
<i>Opuntia pachyarthra flava</i> *	1908
<i>rosea</i> *	—
<i>phaeacantha major</i> *	1900
<i>polyacantha</i>	—
var. <i>erythrostema</i>	1902
<i>salmonea</i>	—
<i>trichophora</i>	1901
<i>Rafinesquii</i> *	1897
var. <i>arkansana</i>	1900
<i>cymochila</i> *	—
<i>Greenii</i> *	—
<i>macrorhiza</i> *	—
<i>nana</i>	1901
<i>rhodantha</i>	1900
var. <i>brevispina</i>	1903
<i>flavispina</i>	—
<i>pisciformis</i>	—
<i>Schumanniana</i>	—
<i>spirocentra</i> *	1904
<i>viridiflora</i> * (? var. of <i>vulgaris</i>)	1900
<i>vulgaris</i> *	1897
<i>xanthostema</i> *	1901
var. <i>elegans</i>	1902
<i>fulgens</i> *	—
<i>orbicularis</i>	—
<i>rosea</i>	—

Opuntias that lived for some years, now killed.

	Number of years in open air.
<i>Opuntia aurantiaca</i> *	3
<i>basilaris</i> v. <i>coerulea</i>	3
<i>cylindrica</i>	2
<i>eburnea</i>	3
<i>Emoryi</i>	2
<i>extensa</i>	2
<i>Tuna</i>	2

Opuntias that died the first winter.

<i>basilaris.</i>	<i>littoralis.</i>
<i>coccinelifera.</i>	<i>microdasys.</i>
<i>clavata.</i>	<i>occidentalis.</i>
<i>Dillenii.</i>	<i>Pes-corvi.</i>
<i>frutescens.</i>	<i>Piccolominiana.</i>
<i>Hanburyana.</i>	<i>tunicata.</i>
<i>leptocaulis</i> var. <i>vaginata.</i>	<i>velutina.</i>
<i>leucotricha.</i>	<i>vestita.</i>

Cereus, species still healthy.

	Planted out.
<i>Cereus flagelliformis</i>	1901
<i>paucispinus</i> *	1900
var. <i>fulvispinus</i> * † (fig. 9)	1899
<i>flavispinus</i>	1900
<i>nigrispinus</i>	1902
<i>phoeniceus</i>	1902
<i>viridiflorus</i> *	1900

† Flowered first in 1903, and each season since. Figured in "The Garden," August 31, 1907, p. 415.



FIG. 9.—*CEREUS PAUCISPINUS*, VAR. *FULVISPINUS*.

[Photo: J. James.]

Cereus, species killed.

Cereus Berlandieri.

Emoryi.

Engelmannii.

Fendleri.

mojavensis.

peruvianus.

var. *hexagonus*.

procumbens.

triangularis.



FIG. 10.—ECHINOOPSIS MULTIPLEX.

[Photo: J. James.]

Cereus (*Echinopsis* section), species alive.

	Planted.
<i>Cereus Mülleri</i>	1905
<i>multiplex</i> * (fig. 10)	—
<i>oxygonus</i>	—
<i>Pentlandii</i> var. <i>Maximiliani</i> *	—
<i>Rohlandii</i> var. <i>speciosus</i>	1905
<i>Schikendentzii</i>	1904
<i>triumphans</i>	1905
<i>Zuccarini</i> *	1905

and six unnamed vars.

Cereus (Echinopsis), species which lived for some years.

	Planted.
<i>Cereus Duvallii</i>	1905-8
<i>Eyresii</i> *	—
var. <i>roseus</i>	1906-8
<i>fuligerus</i> *	—
<i>Lagermannii</i>	1903-8
<i>nigerrimus</i>	1905-8
<i>Pentlandii</i> var. <i>carmineus</i>	1904-8
<i>tubiflorus</i> *	1901-8
<i>turbinatus</i>	1905-8
<i>Zuccarini</i> var. <i>nigrispinus</i>	1905-8

Echinocactus, species which lived some years.

<i>Echinocactus Emoryi</i>	1902-4
<i>luncifer</i>	1902-7
<i>Simpsonii</i>	1900-5
var. <i>minor</i>	—
‘Perpetual Snow’	—
<i>Whipplei</i> var. <i>spinosior</i>	1901-4
<i>Wizlezenii</i>	1902-8

Mammillaria, species still healthy.

<i>Mammillaria missouriensis</i> *	1900
<i>viripara</i> *	—

Mammillaria, species which lived two or more years.

<i>Mammillaria bicolor</i> .
<i>Nuttallii</i> .
<i>gracilis</i> .
<i>pusilla</i> and vars.

Mammillaria, species killed first winter.

<i>Mammillaria castaneoides</i> .
<i>decipiens</i> .
<i>elongata</i> .
<i>Grahamii</i> .
<i>longimamma</i> .
<i>montana</i> .
<i>semperviva</i> .

Succulents other than Cacti alive.

<i>Agave applanata</i> var. <i>Parryi</i>	1902
<i>utahensis</i>	1901
<i>Cotyledon farinosa</i>	1905
<i>Purpusii</i> *	1900
<i>Sedum dendroideum</i>	—
<i>Mesembryanthemum uncinatum</i> *	1897
<i>Umbilicus chrysanthus</i> *	—
<i>spinosus</i>	—

Xerophytes not succulent alive.

	Planted.
<i>Dasyliirion glaucophyllum</i>	1905
<i>serratifolium</i>	} 1907
<i>Wheeleri</i>	
<i>Rhodostachys pitcairniaefolia</i>	1900
<i>Dyckia rariflora</i> *	1901
<i>Yucca Treculeana</i>	1904

THE PROFESSION OF LANDSCAPE GARDENING.

By Mr. EDWARD WHITE.

[Lecture delivered April 28, 1908.]

I WILL not take advantage of the wide scope for observation which the title of my paper seems to offer, but propose simply to consider in a few aspects the profession of landscape gardening as a vocation.

I believe there is enough interest in the calling, and sufficient mystery as to the means by which essential knowledge of it can be acquired, to justify a few reflections.

To Fellows of the Royal Horticultural Society an attempt to define the mission of the landscape gardener would appear an impertinence. No Fellow is so ingenuous as the lady who thought the term an euphemism for persons who tidied up gardens. The designation, however, is inadequate, and it is a pity that one cannot find a short and comprehensive substitute.

In spirit, at all events, we are all landscape gardeners, and much too zealous to allow our conceptions to be confined by garden and park enclosures. We are stimulated by our appreciation of landscape scenery, and anxious to bestow its beauties upon districts where they are non-existent, and, in short, if I may parody a well-worn phrase, "to break down the fence and make all Nature a garden." Closely associated with the desire is the idea cleverly crystallised in the expression "Garden Cities."

A town or city should no longer signify the compression of the largest number of dwellings into the smallest possible space. Neither is what it should be without the adornment of tree-planted streets and parades, in addition to parks, recreation, hospital, and other grounds. In fact we expect that practically every corner of public land, if not already picturesque, shall be subjected to ornamental treatment. The proportion of town areas committed to the care of gardeners is, therefore, happily becoming very considerable, and it is of extreme importance that the whole matter should be under professional direction.

But while the assistance of Nature is being successfully enlisted to relieve the oppressiveness of bricks and mortar in towns, the builder is taking full revenge by his invasion of rural retreats.

Life in the country has become fashionable largely at the expense of much of our best landscape scenery, especially as it is coupled with a desire for the pure air of the more elevated places, which are naturally the most conspicuous points of interest and beauty. The most beautiful districts available for occupation suffer most, and the attractions which tempted the first-comers to many of them are rapidly fading—indeed, the word 'Ichabod' might well be added to advertisement boards standing on many a once sylvan site.

Love of the beauties of Nature is an admirable thing, but it is fatal to the object of admiration when too many suitors press their attentions.

The rate at which virgin country is disappearing is so prodigious that it would be most interesting to know the exact acreage which is annually withdrawn from a free state of Nature. A moment's thought will help us to appreciate the extent of the erosion, and to realise how much land is being cut up for new roads, and either lost to view behind garden fences, or, as may be sometimes worse, defiled and exposed in ugly disorder.

However regrettable may be the transformation of so much beautiful country, any protest would be puerile in view of the social development of which it is a symptom. We can only temper our regret with some satisfaction by insisting that where Nature is dispossessed it shall be succeeded by art worthy of the traditions of the site. Herein lies a legitimate opportunity for the landscape gardener.

Sufficient proof can be furnished that the material advantages which result from expert artistic treatment justify it as a practical consideration.

For the landscape gardener there are problems of great interest involved in the preservation and use of features beautiful and natural, and their combination with technical details essential to the development of building property.

Every road may become a vista of potential beauty, which may be accentuated and not prejudiced by the buildings for the service of which it is created.

The solution of the problems which will give such a result should be greatly aided by the conditions of spaciousness which appear to be necessities of the future.

This is forecasted particularly by the proposals contained in the Town Planning Bill now before Parliament, which meets with sufficient approval to justify an expectation that in some form it will become law. It offers certain local bodies authoritative powers, hitherto unheard of in this country, over areas in their charge. It confers upon them the power to lay down the lines of new roads, irrespective of mixed ownership of the land, and to enforce the execution of their own model plans of development, which will provide for such open spaces as are deemed necessary. One may be quite sure that lively controversies will result from the exercise of these powers, and may entertain the hope that æsthetic considerations will provide their share of debatable points, which can only receive due justice if they are represented by technical advisers who have devoted special study to the subject.

There is some excuse for anxiety on this point when one remembers how often gentlemen, whose official engagements depend on their ability as civil engineers, are saddled with such extraneous responsibilities as the designing of parks and public gardens.

It seems only reasonable that municipalities desiring the luxury of artistic amenities—paid for compulsorily by ratepayers—should obtain designs from, and entrust the supervision of the work to, men technically educated to deal with such matters.

It is no disparagement of some able men who hold municipal gardening appointments to say that the custom does not generally prevail. There

are a few notable exceptions which greatly strengthen the case for a wide extension of the principle advocated.

In this direction there may be a considerable opening for the landscape gardener—but, before it can be confidently demanded on his behalf, the public must be satisfied as to the existence of men fully qualified for the work. It is only if this condition can be secured that the object may be attained.

The increased dignity and prestige which have attended the development of scientific and artistic gardening must facilitate the attainment of such an end. Gardening ranks no longer as a mere hobby. It has developed into a great social factor—an issue into which I need not now enter. It is a nursery of art and the school for the love of Nature.

As a nation we proverbially prefer open-air amusement to artistic indoor pursuits. Gardening as an out-door occupation therefore exhausts a large share of our æsthetic impulses—a share, indeed, so large that it is practically the national art.

Both the art and our country might be equally advantaged by more intimate associations with each other. Art can scarcely desire a better medium of expression than those living forms of vegetation, which supply so many arts with their best material for inspiration.

Although it is suggested that the garden is the school for the love of Nature, it is no paradox to say that the characteristic genius of English gardening receives an impulse from the recognition of the natural beauties of our country.

An English landscape gardener, whose work is to appeal truly to the mass of his fellow-countrymen, in addition to his other qualifications, must have served a long apprenticeship in the school of Nature.

The British Isles, thanks to their geological inconsistency, and to other advantageous peculiarities, offer for study, within the smallest radius, a wonderful variety of types of landscape beauty.

The generosity of Nature in this country is emulated by many owners of beautiful gardens. Their gardens are freely opened to the student, and by this means gratuitous lessons in horticulture and artistic effect are received, advantages resulting from, and only made possible by, great expenditure of time and money. Such liberality is the greater because all that is best is immediately seized for imitation, and, if possible, improved upon.

It would not be inappropriate to allude to the educational facilities afforded by visits to the many splendid nurseries throughout the country, and to the courtesies and goodwill of their owners.

The opportunities for self-education offered to men who wish to follow the profession of landscape gardening are therefore numerous and varied, and at first sight it may appear that they are sufficient.

Whether this be so or not depends entirely upon the ambition of the student, and the scope of action which contents him or her. If he desires to be self-reliant and does, not wish, for instance to be continually referring to the architect, civil engineer, or surveyor, for technical assistance, he must be versed in such details of these sciences as are essential to his operations. It is exceedingly difficult, however, for a student to discriminate in the acquisition of knowledge of these details, and avoid

wasting much time upon unnecessary matter. To a person whose temptation to embark on the career is solely the love of gardening, the idea of mastering two or three other pursuits seems appalling and unnecessary—unnecessary it certainly would be for him. The chances are that he will refuse to enter upon such subjects, and that if he does not decide to abandon his aspirations he will devote himself to a system of gardening which affects to despise the so-called extravagances of constructional effort, and confine himself to a sphere of activity which is strictly limited.

It really seems unnecessary to emphasise such a point as the value to any young man of having his business education mapped out, and directed by proper advisers, especially when he is preparing for a profession which numbers among its supporters such a large number of highly skilled amateurs.

Foreign critics of our educational methods might possibly recognise landscape gardening as our national art from the fact that it is practically untaught in this country.

There are a few centres of enlightenment devoted to horticulture in which the subject is treated, I believe, as an important branch of gardening, but I have been unable to discover any educational institution which adequately recognises it as affording professional possibilities, distinct from horticulture. It is certain that many earnest young men who desire to adopt the career are at a complete loss as to the best means of doing so. Some of them have been blindly through a long course of horticultural study, and at the end have found themselves lacking in many essential qualifications.

There are, of course, considerable difficulties in the way of providing education on an adequate scale, but if the gardening-world were unanimous in demanding it, an important step would have been taken towards their removal.

It is an obvious criticism that with so much difference of opinion among garden designers, as to what constitutes beauty in a garden, it might be difficult to hit on a form of teaching which would meet with enough general approval to warrant the experiment. After a century or so of controversy, however, the matter seems to be simmering down sufficiently to render practicable a sort of "Cowper Temple" settlement.

A good deal of hard language has been uttered against both formal and informal gardens by men whose prejudices incline them towards one or the other, but each form of art seems to have thriven upon abuse, and become unshakably established. Whatever his personal preferences may be, however, a landscape gardener with a catholic practice must be competent to deal with all sides of the question, and the education of a student must accordingly be shaped on the basis that landscape gardening is, in its essence, an eclectic art.

Thinking it would be interesting to know something of what was being done in other countries in the matter of education, I have sought for information from some eminent gentlemen, who have given it to me with the utmost kindness and readiness.

In Germany the subject of landscape gardening is not included in the curriculum of any University. Instruction in the art is given, however,

in all public and private horticultural schools. The chief school (formerly at Potsdam) is now at Dahlem, near Berlin, where great attention is given to the question. At Laubegast, near Dresden, a great speciality is made of it in the Gartenbauschule. There are also important schools at Weißenstephan in Bavaria, at Reutlingen in Württemberg, and a private school in the principality of Reuss.

There are now two national societies of landscape gardeners in Germany, and it is interesting to know that there is some difference of opinion as to whether garden construction is a perquisite of the architect, or should be the privilege of the landscape gardener. We seem to have heard the echo of such a doubt over here.

One hears incidentally that the designing of race-courses occupies a considerable share of the time of some of the best landscape gardeners in Germany, but it can scarcely be suggested that this diversion offers an extended field for practice in England.

In France, landscape gardening is taught in no University or public school, although it is exhaustively treated at the *École Nationale d'Horticulture* in Versailles, which is considered the University of Horticulture. It is also made a special subject for study at the *École d'Horticulture de la Ville de Paris*. There is no society of landscape gardeners in France, beyond that formed by a special section of the National Horticultural Society.

Landscape gardening is taught in Austria in all Horticultural Training Schools, particularly in the Agricultural School at Eisgrub (near Sindenburg), Lower Austria, but there is no society or special department for landscape gardening in Austria.

It is in the United States, however, that one finds a model precedent which may be of great assistance, and it will surprise many to find how seriously the question of education in the art of landscape gardening is considered in that go-ahead country.

It is, in many respects, an ideal land for the development of gardening of all kinds, owing to the individual wealth and public spirit of the inhabitants, to competition in luxury, to the sylvan resources of the country, and to the new and vast spaces available for treatment.

The capacity of Americans to concentrate and specialise makes them rivals always to be respected, and there is little fear that impracticable schemes of education will be found at their best Universities.

Americans use the phrase "Landscape Architect" in place of our term "Landscape Gardener," but in the references which follow the English expression is substituted.

Definite instruction in landscape gardening is given at Cornell University, Ithaca, New York; at the University of Illinois, Urbana; at Columbia University, New York City; at Massachusetts Institute of Technology, Boston, and at Harvard University, Cambridge, Mass.

Some tuition in landscape gardening is offered by many of the horticultural and agricultural schools and colleges, but I do not know what weight is to be attached to it. A typical example of this group is to be found in the Massachusetts State Agricultural College at Amherst.

The course offered at the famous University of Harvard is decidedly the most complete and important obtainable in America.

The official register of the University deals with, and illustrates, the importance attached to the question so fully that I shall venture to quote verbatim, and piece together a good many points of information and advice contained in it.

A pamphlet issued in 1907 states that "the object of the courses of education outlined is to provide instruction in the elements of technical knowledge, and training in the application of principles of design, which together form the proper basis for the professional practice of landscape gardening."

A student may obtain professional training in landscape gardening in Harvard University, including both elementary and advanced work, or having had the necessary preparation in another college or scientific school, may proceed at once to the graduate courses.

By registering in Harvard College a student may elect courses which will be counted for the A.B. or S.B. degree and prepare him for the concentrated professional study in the Graduate School of Applied Science.

The professional course in this school is open to graduates of any college or scientific school of good standing as candidates for the degree of "Master in Landscape Architecture."

The object of this course, to quote the Official Register, is to give the students a broad knowledge of many types of landscape and garden forms, of the elements which make up the quality of each, of the motives which underlie them when of artificial creation, of their limitations, and of the constant adaptation of means to ends in all good work. The instruction is in the form of lectures, supplemented by collateral reading, by informal conferences, and by frequent exercises in writing or drawing. The types of landscape and garden design are severally taken up in the historical order of their highest development, but in addition to the critical description of historical examples with the aid of plans, drawings, and photographs, reference is made whenever possible to actual examples, illustrative of the same principles, to be found in the vicinity of Boston, which students may readily visit.

During the year each student is required to make a study of one example of formal and one of informal landscape work, one special type of landscape design, and one example of natural landscape, and to submit a report in each case.

The length of the period of study necessary will depend upon the candidate's previous preparation. Two years will ordinarily be required by a capable student properly prepared. Any deficiencies in preparation can be made good after entering the school.

Opportunities for advanced special study are open to students not candidates for a degree.

With the best technical training, the professional success of a landscape gardener must depend largely upon his ability to understand the wide range of purposes and ideals which he is sure to find among his clients, and in no way can this ability be fostered more effectively than by the broadening influence of a college education.

The courses in Harvard College which are particularly advised are the following :—

Principles of Landscape Gardening.

Elementary Botany.

Experimental Physics.

Physiography.

Elementary Geology.

Principles of Design in Architecture, Sculpture, and Painting.

Ancient and Renaissance Architecture, and the Theory of Design.

In addition to the studies, which form reasonable parts of a general college education, the undergraduate who looks forward to becoming a landscape gardener is advised to take the summer course in topographical and railroad surveying at the Harvard camp, or its equivalent, and should become well acquainted with the common trees and shrubs. If he has had the opportunity of getting first-hand acquaintance with the soil and plants through the common work of practical farming, or some kindred occupation, he will find it, in the long run, helpful to a remarkable degree.

Any intelligent student will appreciate that he must have a good command of English, since an essential part of a landscape gardener's duties must be to explain clearly and convincingly to others the reasons for his advice to them. In addition, it is very desirable that the student should be able to use French and German books with tolerable facility.

What is not so generally realised by students beforehand is the vital importance to the landscape gardener of facility in graphic expression. He must be able to draw readily a simple, straightforward, and accurate representation of the forms which he sees or wishes to describe, whether by sketches, plan, or section, and the alphabet of this graphic language, which he must use all his life, ought to be learned early and practised constantly.

On the basis of such preparation a student can obtain a good professional equipment by three or even two years devoted solidly to technical work. No definite programme is here laid down for such a post-graduate course, because it can best be fitted to the needs of the individual; but it would always include two years of practice in general landscape design and details of construction, continued study of plants and planting design, and, so far as not already studied, elementary architectural design, water supply and sanitary engineering, masonry and foundations, contracts and specifications, and such additional work in engineering, horticulture, and general landscape design as time and capacity permit.

It should further be said that while the training above discussed should make a student a useful assistant to a landscape gardener, it is not expected to turn him out competent to practise, and it should be followed by at least two or three years of practical experience in the employ of an established landscape gardener, and, if possible, by travel for the study of professional subjects in this country and in Europe.

These quotations testify to the importance attached to the question of education in landscape gardening in America, and the hope of the establishment of adequate recognition in this country is therefore absolved from the charge of being visionary.

It may be recalled that a scheme of instruction was started at the Crystal Palace as long ago as 1881 under seemingly encouraging auspices.

I have in my possession a book full of press eulogies and predictions published at its initiation which make interesting and instructive reading. The scheme failed eventually, but, since the conditions attending the rise and fall are not likely to recur, it is unnecessary to consider it as an unfortunate precedent. It would be scarcely correct at this moment to call by name upon any educational body to take the matter into consideration. A necessary preliminary would be an expression of opinion favourable to the idea from the most influential forces of the gardening world. If this were forthcoming one might hope to find in the City of London an institution with sufficient prestige, enlightenment and resources to contemplate a serious handling of the question.

An influence of great weight with the managers, governors or senate—whatever they might be—of such an institution would be the knowledge that any action taken by them in this direction would receive the cordial support of the Royal Horticultural Society.

PHOTOGRAPHY IN NATURAL COLOURS.

[Abstract of Lecture delivered by T. Ernest Waltham, F.R.H.S., January 28, 1908.]

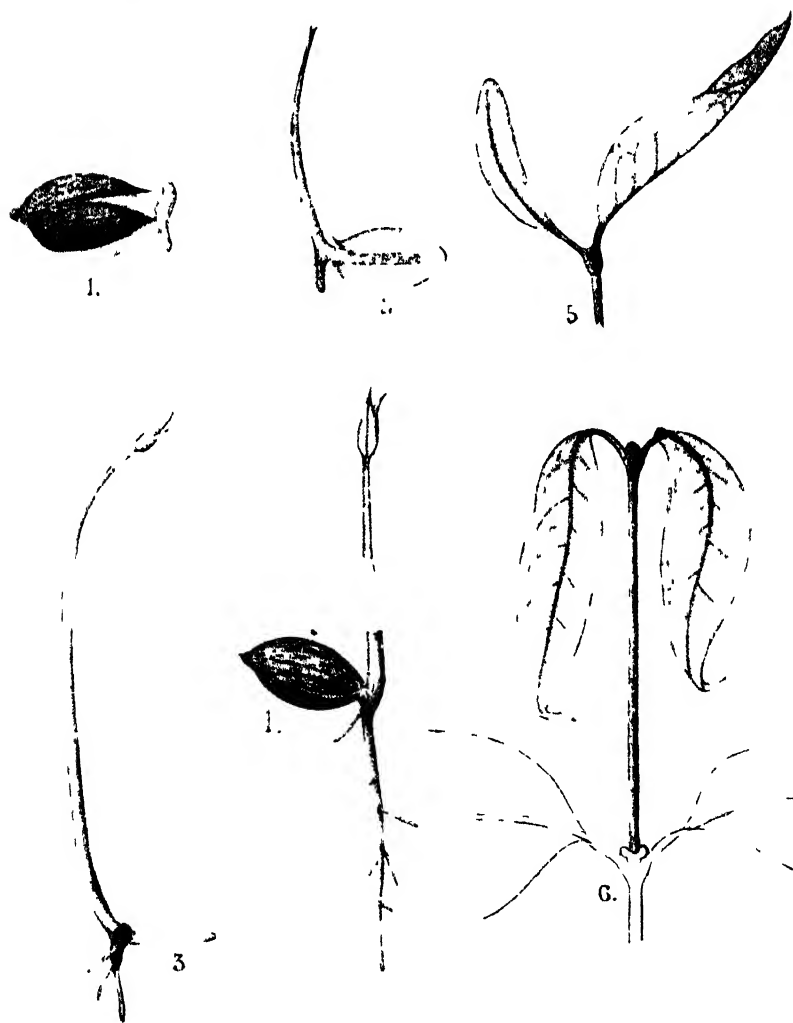
THE lecturer exhibited by means of the lantern a splendid series of slides illustrating the high standard to which photography of flowers in natural colours had attained. Mr. Waltham did not claim to have invented an entirely new process, but by the use of a combination of two and sometimes three existing processes, together with a method of his own devising, he was able, under favourable circumstances, to be sure of getting results true to Nature: how true the slides exhibited abundantly testified. He stated that he had also been able to perfect a method of getting the prints on to paper when only a few were required. The series of slides included portraits of dahlias, orchids and ferns, which were followed by views of Holland House and the Japanese Garden there, pictures of a few scenes in the Wisley Garden, including a grand specimen of *Spiraea Aruncus*, a gigantic *Gunnera*, and groups of *Iris Kaempferi* and water-lilies; a border of Michaelmas daisies and a rose garden from other localities, and a beautiful slide showing primroses in a wood at Horsham.

In order to show the character of the winter through which alpine plants pass in Switzerland, slides showing snow- and ice-clad rocks, glaciers, snow-laden conifers, and so on, at different places in the Alps were exhibited, while slides made of the alpine flora in summer showed single plants and groups of such well-known things as *Epilobium rosmarinifolium* growing at an altitude of about 5,800 feet among loose stones, *Lychnis flos-Jovis*, with the yellow foxglove, and the blue and the yellow aconite, the yellow gentian (*Gentiana lutea*), and *Veratrum album*, *Dryas octopetala*, various ferns, *Gentiana bavarica* growing in long grass with *Ranunculus aconitifolius* close by, the deep-coloured flowers of *Rosa alpina*, and the alpine violets, *Viola calcarata* and *V. biflora*. All these were shown as photographed in their natural colours, and growing in their native home.

THE GERMINATION OF *GNETUM GNEMON*, L.

By T. G. HILL, A.R.C.S., F.L.S.

THE seeds from which the seedlings forming the subject of the present communication were grown were received by the writer from Dr. Treub,



J & M del adnot.

FIG. 11.—GERMINATION OF *GNETUM GNEMON*. (Natural size.)

the Director of the Botanic Gardens, Buitenzorg, Java, and were germinated by Mr. Hales, the Curator of the Old Physic Garden, Chelsea.

Mr. Hales exhibited the seedlings at the meeting of the Scientific Committee on April 28, 1908, and I have been asked to contribute a short note on the exhibit.

The subject being one which is better treated by means of illustrations than by descriptions, the accompanying figures, all of which are natural size, have been prepared and render a long account unnecessary.

Fig. 11, 1 represents an early stage in germination. The seed coat has broken, and the primary root has developed to a slight extent; the tip of the hypocotyl, with the two minute cotyledons, is still contained within the prothallus. This condition does not last for long, the hypocotyledonary axis is soon removed from the seed and grows upright (fig. 11, 2). Attention may be drawn to the fact that the seed-leaves are still quite small, and do not function as organs of absorption, this rôle being performed by a highly specialised organ, the foot or sucker, which is buried in the tissue of the seed which contains the reserve food-materials (fig. 11, 2).

The third illustration represents an older seedling having the cotyledons more developed. Before drawing this specimen the seed itself was entirely removed in order to show the rod-like character of the foot. It will be observed that the radicle is still very small, although lateral roots have made their appearance, a character which recalls the features obtaining in the seedlings of a large number of Monocotyledons. The primary root of *Gnetum*, however, does not remain stunted for long; it elongates and forms a prominent root of the same nature as that found in the majority of Gymnosperms (fig. 11, 4). As development proceeds the cotyledons increase considerably in size, and perform an assimilatory function (fig. 11, 5). It will be observed that the seed-leaves of the plant represented in the fifth illustration are unequal in size; this is a feature which is not at all uncommon in the seedlings of *Gnetum Gnemon*.

Fig. 11, 6, represents the upper part of an older seedling, and shows the first pair of foliage leaves which are arranged on the axis at right angles to the plane of insertion of the cotyledons. Further, it will be noticed that the seed-leaves, partly indicated at the base of this drawing, have grown considerably (cf fig. 11, 5).

Summarising the chief features of interest—

1. The foot is a prominent structure containing vascular tissue and developed to a greater extent in *Gnetum* than in either *Welwitschia* or *Ephedra*.

2. The primary root is at first very slow in its development, being nothing more than a peg-like structure. Later, it grows rapidly and forms a well-marked tap root.

3. The cotyledons at first are very small indeed; after some time they expand considerably and resemble the foliage leaves. They are often unequal in size.

Much information concerning the structure of the seedlings of *Gnetum* may be found in a paper by Professor F. O. Bower, entitled "The Germination and Embryogeny of *Gnetum Gnemon*," in the "Quarterly Journal of Microscopical Science," vol. xxii. 1882.

BRASSICA CROSSES.

[Abstract of Paper read before the Scientific Committee, March 3, 1908.]

MR. A. W. SUTTON, F.L.S., V.M.H., gave an account of his experiments in crossing species and varieties of the genus *Brassica*, illustrating his remarks by means of lantern slides. The experiments were started in 1900 with the primary object of ascertaining which forms commonly cultivated could be intercrossed. At first several varieties of *Brassica oleracea* were planted close together in order that intercrossing might take place freely, and as a result of sowing seed a very heterogeneous lot of nondescript forms, few of which were true to the parental type, were obtained. A repetition of the experiment on slightly different lines gave similar results, but in this second set of experiments varieties of turnip, swede, and oil-yielding rape were included. None of the forms derived from seed of any of the varieties of *B. oleracea* showed any influence of rape, swede, or turnip, and *vice versa*, but the varieties of *B. oleracea* were found to cross freely between themselves as before, and the same was true of many varieties of turnips, swede, and rape. Later the experiments were still further extended, so that it was definitely known what pollen was used in producing the seed of the various varieties tried. Among the results yielded were the following:—

(a) No seed was produced when cabbage, kohlrabi, and thousand-headed kale were crossed with swede, turnip, colza rape, asparagus kale, or ragged Jack kale.

(b) Swede ♀ × turnip ♂ yielded plump seed of a black colour and excellent germinative capacity, but the reciprocal cross yielded pale shrivelled seed which germinated with difficulty and produced weakly plants, which, however, under careful treatment developed as strongly as the others and showed similar characters. The flowers proved sterile, and the plants were in the main intermediate between their parents - facts which Mr. Sutton thought pointed to the specific distinctness of the swede and the turnip. The plants were so different in character from the so-called "hybrid" yellow-fleshed turnip that it would appear very unlikely that the latter has originated by the crossing of the swede and the turnip. Hybrids which proved sterile or were not hardy were also reciprocally raised between rape and swede, rape and turnip, asparagus kale and yellow tankard swede, ragged Jack kale and yellow swede, asparagus kale and white turnip.

(c) Other crosses gave abundant and fertile seeds, the plants from which produced seed in the second generation, when in every case segregation occurred. This was the case when ragged Jack kale was reciprocally crossed with white swede, kohlrabi with thousand-headed kale, kohlrabi with drumhead cabbage, thousand-headed kale ♂ with drumhead cabbage ♀ and swede ♂ with asparagus kale ♀ (there were no reciprocal crosses in the last two cases). In many cases the segregation

occurred in the proportions expected according to Mendel's laws, but in others this was not so clearly shown. The Mendelian proportions were perhaps best seen in the segregation of the character of fleshiness or "bulbing" in the lower part of the stem shown in the second generation, but were not visible only here, as in several instances the character of the foliage also showed the same kind of phenomena.

It is noticeable that the hispid green-leaved turnip crossed with the hispid glaucous-leaved swede proved sterile, and that ragged Jack kale and asparagus kale, which like the swede have hispid glaucous foliage when young, cross readily with the swede.

A few unaccountable and interesting phenomena were met with, such as a form of leaf in the second generation totally unlike that exhibited by either of the parents, and, in the case where the drumhead cabbage was one of the parents, in the appearance in the second generation of a purple coloration in the foliage. .

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

III. AZALEA GALL (*Exobasidium Japonicum* SHIRAI).

By FRED. J. CHITTENDEN, F.L.S.

IN the year 1896 M. Shirai * described a gall upon the Indian Azalea (*Rhododendron indicum*, usually known in gardens as *Azalea indica*), and stated that it was very common upon that plant in Tokyo in May.



FIG. 12.—FUNGUS-GALL ON RHODODENDRON INDICUM. (Natural size.)

The gall was found to be due to the attack of a fungus, up to that time undescribed, which Shirai described and named *Exobasidium japonicum*.

* "Descriptions of some new Japanese Species of *Exobasidium*," in *Bot. Mag.*, Tokyo, 1896, p. 52.

Recently specimens of galls upon this plant, agreeing exactly with those described by Shirai, have reached us from two different places, one on the Continent and the other a garden in Cornwall. From this it would appear that the disease has obtained a footing in Europe, though it has probably not yet spread far enough to prove troublesome to many growers. The object of this note is to draw the attention of the numerous cultivators of these Azaleas to the disease, so that steps may be taken immediately upon its appearance to check its spread.

China and Japan are the countries from which at one time considerable numbers of these plants were introduced to this country, and at present plants ready for flowering are imported in large numbers from the Continent, so that there is great probability of plants already infected entering the country.

The galls are of large size, measuring up to 2.5 cm. to 3 cm. in diameter (*i.e.*, up to over 1 inch), and in all the specimens I have so far seen the whole of the terminal bud of a shoot has been involved in the swelling. Shirai, however, states that the fungus sometimes causes the malformation of a single leaf only, or even of only a portion of a leaf, in which case the gall appears as a globular swelling upon the under side of the leaf. The size and form of the gall in the Cornish specimen are shown in the illustration (fig. 12). The gall is at first greenish, or yellowish green, and glossy, sometimes where exposed to bright light becoming pink, but later, as the fungus develops, it becomes covered with a delicate whitish bloom, owing to the breaking through the epidermis of the fruiting threads of the fungus. The spores are produced in large numbers and are borne on small outgrowths from the tips of the basidia, as the spore-bearing cells are called; each basidium bears four or five spores, usually four. The increase in the size of the affected leaves is no doubt due to the irritation set up by the presence of the fungus, and not only is the shoot which is affected prevented from flowering or elongating, but a considerable amount of the material which should have been devoted to the development of other parts of the plant is withdrawn for the use of the fungus and for the growth of the gall. When the gall is removed from the plant it shrivels very considerably.

The galls produced are very similar in appearance and character to those common upon *Rhododendron ferrugineum* and *R. hirsutum* in the Alps and in this country, the main differences lying in the difference of host and the different size of the spores produced by the fungus, which in this case measure about $14.5\ \mu$ in length by $4\ \mu$ in breadth.

The best method of controlling the pest is to remove the galled leaves or shoots upon their first appearance and destroy them by fire. If this be done sufficiently early before the spores are produced, there will be little danger of the disease spreading.

Similar gall-like growths are produced upon other species of *Rhododendron* through the attacks of species of *Exobasidium*, e.g., *E. Azaleae* on *Rhododendron nudiflorum*, *E. discoideum* on *R. viscosum*, *E. hemisphaericum* on *R. Metternichii*; species of *Andromeda*, *Lebetanthus*, *Cassandra*, *Cassiope*, *Giseckia*, *Ledum*, *Vaccinium*, *Symplocos*, *Guy-lussacia*, *Saxifraga*, etc., are also attacked.

GARDENING IN THE WESTERN HIGHLANDS.

By OSGOOD MACKENZIE, F.R.H.S.

[Lecture read May 12, 1908.]

IN the year 1862 my mother bought for me the two adjoining estates of Inverewe and Kernsary, on the west coast of Ross-shire.

Kernsary lay inland, but Inverewe had a good many miles of coast-line, and, after taking about two years to settle as to where we should make our home, we finally pitched upon the neck of a barren peninsula as the site of the house. The peninsula was a high rocky bluff, jutting out into the sea, and the rest of what are in Scotland usually called "the policies" (*i.e.*, the enclosed grounds round about the mansion) consisted mostly of steep braes facing south and west, with the exception of a narrow strip of land down by the shore—the only bit where the coast-line was not rocky—and this strip, which was an old sea-beach, was turned into the garden. I may say the peninsula, whose Gaelic name, *Am Ploc ard* (the High Lump), so aptly describes it, consisted of a mass of Torridon red sandstone (which is, I think, a pre-Cambrian formation, and lies on the top of the Lewisian gneiss). This promontory, where the rock was not actually a bare slab, was mostly covered with short heather and still shorter crowberry, and positively the only soil on it was some black peat, varying from an inch to two or three feet in depth. There had been more peat originally in some of the hollows, but it had been dug out for fuel by the crofters who had occupied the place forty years before my time. There was nothing approaching good soil on any part of the peninsula, hardly even any gravel or sand; but in a few places the rotten rock and the peat had somehow got jumbled up together, and when we came across some of this we thought it grand stuff in comparison with the rest. There was just perhaps one redeeming point about what was otherwise so hopeless a subject for planting, *viz.*, that the rock was not altogether solid.

We had to excavate a great deal of the rock behind the site of the house before we could begin to build, and we noticed that the deeper we blasted into it the softer it became, and that there were even running through it veins of a pink kind of clay; but, on the other hand, the exposure of the *Ploc ard* was awful, catching, as it did, nearly every gale that blew, and, with the exception of the thin low line of the north end of the Lewis, right away on the horizon, forty miles off, there was nothing between its top and Newfoundland; and it was continually being soused with salt spray.

The braes above the site of the house were somewhat better, but even they were swept by the south-westerly gales, which are so constant, and so severe, in these parts.

Now, before proceeding with my story, I think I ought to explain that, with the exception of two tiny bushes of dwarf willow about

three feet high, there was nothing in the shape of a tree or shrub anywhere within sight; one of these little willow bushes I have carefully preserved as a curiosity, and on the site where the other was I lately planted an azalea, which will, I think, soon look down on its neighbour, the poor little aboriginal willow.

I started work in the early spring of 1864 by running a fence across the neck of the peninsula from sea to sea, to keep out the sheep. I was very young then (not being of age when the place was bought), and perfectly ignorant of everything connected with forestry and gardening, having never had any permanent home, and having been brought up a great deal on the Continent, but I had all my life longed to begin gardening and planting, and had, I fully believe, inherited a love for trees and flowers from my father and grandfather.

My mother undertook the whole trouble of house-building, and I set myself to the rest of the work with a determination to succeed if possible. Oh that I had only known then what I know now, and could have started with my present experience of over forty years! For example, I had never heard of the dwarf *Pinus montana*; had I known its merits then, as I know them now, I would have begun by planting a thick belting of it among the rocks right round my peninsula, just above high-water mark, to break the violent squalls carrying the salt spindrift which is so inimical to all vegetation. I did not know that there was little use in planting *Pinus austriaca*, mountain ash, service, or even birches in the middle of a wood, as, though they look nice for some years, they eventually get smothered by the faster-growing trees, and one has the trouble of cutting most of them out. If I were beginning again I would commence, as I have already said, with a row of the Tyrolese *Pinus motana* above high-water mark, then put *Pinus austriaca* behind it, and for the third row I would plant that admirable tree *Pinus Laricio*; this triple row would form my fortification against the ocean blast, and, thus protected, behind these I would start putting in my ordinary forest trees, Scotch pines, silver firs, sycamores, oaks, beeches, &c.

If I were asked what tree I have the highest opinion of for hardiness and rapidity of growth on bad soil and on exposed sites, I would certainly award the first prize to the Corsican pine. I have seen them in their own island on mountains 9,000 feet above sea level, with nothing between them and Spain or Algeria, growing to an enormous size—some of those I measured there being twenty feet in circumference—and here, at the same age, they make nearly double the amount of timber compared with Scotch fir, and are proof against cattle, sheep, deer, and rabbits, which no other tree is, that I know of. They told me in the ship-building yards at Savona that old *Laricio* timber was as good as the best Baltic redwood.

I am ashamed to confess, but it can no longer be hidden, that, among trees, many of the foreigners are far and away hardier and better doers than our natives. The Scotch fir (as bred nowadays) is often a dreadfully delicate tree when exposed to Atlantic gales. It was not so in the good old times, as one finds the enormous remains of *Pinus sylvestris* forests right out on the tops of the most exposed headlands of our west coast.

My brother, the late Sir Kenneth Mackenzie of Gairloch, gave me 100 plants of the right breed from his old native fir wood of Glasleitir, on the shores of Loch Maree, which, like the rest of that good old stock at Coulan, in Glen Torridon, or in those grand glens of Locheil, are as different in growth and constitution from what are, alas! too often sold nowadays as Scotch firs as Scotch kale is from cauliflower. I have seen the seedlings side by side in the seed-beds in my brother's Gairloch nursery, and in the months of March and April the seedlings from the bought seed were of a rusty red, as if scorched by fire, whereas the home-bred ones were of a glossy dark green.

For four or five years my poor peninsula looked miserable, and all who had prophesied evil of it (and they were many) said, "I told you so." But at last from the drawing-room windows we could see some bright green specks appearing above the heather. These were the Austrians and the few home-bred Scotch firs which had been dotted about in the places of honour near the house; and about the fifth or sixth year everything began to shoot ahead; even the little hardwood trees, which up till then had grown, or rather died, downwards, started upwards, many of them fresh from the root. Now came the real pleasure of watching the fruit of all our labour and anxiety.

The young trees had fewer enemies then than they would have nowadays. Grouse strutted about among them, wondering what their moor was coming to, but did no harm. Black-game highly approved of the improvements, and by carefully picking all the leading buds out of the little Scotch firs did their level best to make them like the bushy *Pinus montana*. Brown hares and blue hares cut over a few of the fat young shoots of the Austrian pines and oaks; but, on the whole, my young trees fared well in comparison with the way young plantations here would fare now from the rabbit plague, and the roe and the red deer!

I planted very few of the rarer trees to begin with. Wellingtonias were then the rage, and I felt bound to invest in four of them, and planted them in the best sites I could find near the house. I tried to make pits for them; I took out the little peat there was, but how well I remember the clicks the spades gave when we came to the bed rock; and next morning (the night having been wet) all we had produced were four small ponds, and I had to get an old man to bring me on his back creels of rather better soil for them from a distance. I have just measured my Wellingtonias, and in the forty-three years they have been planted they have made some sixty-six feet of growth, and are about eight feet in circumference six feet from the ground, and their strong leaders show they are still going ahead. So much for the old man and his creels of soil!

Silver firs in the hollows have done well, and some of them are sixty to seventy feet high also. One thing has surprised me very much—viz., that oaks, of which I planted but few (thinking it was the very last place where oaks would do), are very nearly level with the firs, larches, and beeches.

It was only after the plantation on the peninsula had been growing fifteen or twenty years, and was making good shelter, that I began

cutting out some of the commoner stuff, especially my enemies the "shop" Scotch firs, as I call them, which continued more or less to get blasted by the gales of the ocean, and then it was I began planting all sorts of things in the cleared spaces—Douglas firs, *Abies Albertii*, copper beeches, sweet and horse chestnuts, *Picea nobilis*, *P. Pinsapo*, *P. lasiocarpa*, and *P. Nordmanniana*, *Cupressus macrocarpa* and *C. Lawsoniana*, *Thuja gigantea*, bird-cherries, scarlet oaks, &c.—and now these trees appear almost as if they had formed part of the original plantation. I am still going on a little in this style, and have dotted about a lot of Eucalypti, tree Rhododendrons, Arbutus, Griselinias, Cordylines, and clumps of bamboos and Phormiums, which are giving a charming finish to the outskirts of my plantation.

Even the Eucalypti I find much hardier than that bad breed of Scotch fir; no wind, snow, or frost seems to hurt them here; and in case it may interest my hearers I will name those I find thoroughly hardy: *Eucalyptus coccifera*, *Gunnii*, *Whittinghamii*, *cordata*, *coriacea*, *urnigera*, and one or two others; but I warn all against trying *Eucalyptus globulus*—and yet that is the very species that most people persist in planting.

I ought perhaps to mention what does not do with me, viz., the common Norway spruce. They will grow in low-lying hollows at the rate of nearly three feet a year, but as soon as they get to about thirty feet in height they look (as my forester very aptly describes them) like red-brick chimneys among the other trees, and even if not directly exposed to the ocean gales they get red and blasted. I tried also a few *Pinus Strobus* in the peninsula, but they quite failed. I much regret not having experimented on either *Pinus Cembra* or *Pinus insignis*. I know the first-named would succeed, and, as the Monterey cypress (*Cupressus macrocarpa*) does so very well, I should have the best of hopes of the Monterey pine also, as they both come, I am told, from the same locality in California.

My latest craze is cutting out spaces, enclosing them with six-foot fences (deer, roe, and rabbit proof), and planting them with nearly every rare exotic tree and shrub which I hear succeeds in Devon, Cornwall, and the west of Ireland; and I think I may venture to say that I have been fairly successful, and nothing would give me greater pleasure than if I could look forward to a visit of inspection from some of the members of the R.H.S. I fear I must confess to feelings of exultation when I visit that charming collection in the temperate house at Kew, and assure myself that I can grow a great many of its contents better in the open air up here in the far north than they can be grown at Kew under glass.

What a proud and happy day it was for me, about two years ago, when Mr. Bean of Kew honoured me with a visit, and I had the pleasure of showing him my Tricuspidarias, Embotheriums, and Eucryphas, my small trees of *Abutilon vitifolium*, my palms, Loquats, *Drimys*, Sikkim Rhododendrons, my giant Olearias, Senecios, Veronicas, Leptospermums, my Metrosideros and Mitrarias, &c. I have, too, some of the less common things. One of them is a nice specimen of the *Podocarpus totara*, from which the Maoris used to make their war canoes holding

100 men, and I have a *Dicksonia antarctica*, raised from spores ripened in Arran, and my *Cordyline australis* are all from seed ripened at Scourie, in the north of Sutherland. The *Billardiera longifolia*, from Tasmania, with its wonderful blue berries, is a most striking climber. *Acacia dealbata*, the Antarctic beech, *Betula Maximowiczii* from Japan (with leaves as big as those of the lime), the New Zealand Rata, and *Buddleia Colvillei* from the Himalaya, are all flourishing, thanks to the Gulf Stream and lots of peat and shelter. There are (as I suppose must be the case everywhere) a very few things which are not happy here, and they are plants which I dare say most people would have thought would have revelled in this soil and climate, viz., the Wistarias, Camellias, Kalmias, *Euonymus*, Tamarix, and Cyclamens, but I hope to master even these in course of time. One thing I wonder at is, how so many of my exotics seed themselves far more freely than any natives, except perhaps birch, and gorse, and broom, though I ought perhaps to mention that neither of the two latter is indigenous to this particular district. The strangers which seed so freely are *Rhododendrons*, *Cotoneaster Simonsii*, *Berberis Darwinii*, *Veronica salicifolia*, *Olearia macrodonta*, *Diplopappus chrysophylla*, and *Leycesteria formosa*.

And now I will venture to say something about the garden (the kitchen garden, as my English friends always take care to call it).

As is often the case with us poor Highlanders, I only possess the one garden for fruit, flowers, and vegetables, and, as I have already stated, it was mostly made out of an old sea beach, which most people would say does not sound hopeful. Even now, in spite of a wall and a good sea bank, the Atlantic threatens occasionally to walk in at its lower doors, and the great northern divers, who float about lazily just outside, appear quite fascinated by the brilliant colours inside when the lower doors are left open for their benefit.

The soil of this old sea beach was a four-foot mixture of about three parts pebbles and one part of rather nice blackish earth, and the millions of pebbles had to be got rid of. So in deep trenching it digging forks were mostly used, every workman having a girl or boy opposite him, and the process of hand-picking much resembled the gathering of a very heavy crop of potatoes in a field. The cost of the work was great, as thousands upon thousands of barrow loads of small stones had to be wheeled into the sea, and the place of the pebbles made up with endless cartloads of peaty stuff from old turf dykes, red soil carted from long distances, and a kind of blue clay marl from below the sea, full of decayed oyster-shells and crabs and other good things, and hauled up at very low tides! There is also a terrace formed the whole length of the garden, cut out of the face of a steep brae, which was just above the old beach, and it had to be carved out of the solid gravel, and soil brought from afar put on it. The cutting at the top was fully 12 feet deep, and against it a retaining wall was built, which I covered with fan- and cordon-trained fruit trees.

When the cutting was first made we found a number of large holes or burrows, going deep into the hillside. These, we were convinced (by the various signs we found), must have been inhabited in prehistoric

times by a colony of badgers, and no sooner was the light let into these galleries than up came a thick crop of raspberry seedlings, as far in as the light could penetrate. It appeared evident that the badgers (like bears) had been keen on fruit, and had made their dessert off wild raspberries, and that the eating and digestion of the fruit had not prevented the seeds from germinating (as is the case nowadays with the seeds of *Berberis Darwinii*, which the birds swallow, and then distribute all over the place). There were no signs of any wild raspberries about here at that time, but the sight of them encouraged me greatly, and I thought it a good omen, and that where wild rasps (as we call them) once grew tame rasps could be made to grow, and my expectations in this respect have been fully justified. I think I may venture to say that my garden, which took me three or four years to make, has most thoroughly rewarded me for all the trouble and expense incurred.

In good years (as many of my friends can testify) I grow Bon Chrétien pears on standards as good as could be bought in Covent Garden Market, and, curiously, they were always better off the standards than off the walls; but, alas! last year (which was the very worst year I had experienced since my garden was made) they were (as my gardener expressed it) not equal to a good Swede turnip. I have had excellent Doyenné du Comice pears and Cox's orange pippin apples on my walls, and masses of plums of all sorts both on the walls and on standards, and there is one thing I may mention, which I hardly suppose even my friends in the south can boast of—viz., that I have never yet, in over forty years, failed to have a full crop of apples, and, I might almost add, pears and plums as well, though the quality varies a good deal; but really our difficulty here is that we have not force sufficient to get them thinned, so thickly do they set; and all this must, I suppose, be credited to our good Gulf Stream.

And now I will turn to the flowers, and I think almost anything that will grow in Britain will grow with me. I was once in a garden in about the warmest corner of the Isle of Wight, in June, and walking round with my hostess, we came upon the gardener carrying big plants of *Agapanthus* in tubs from under glass to be placed out of doors. His remark as we passed him was, "I think, my lady, we may venture them out now"; and I could not refrain from answering the old man back, "If so, then I do not think much of your climate, for in the far North of Scotland we never house them, nor even protect them in winter." I have had great clumps of *Agapanthus* in the open for thirty years and more, and the white, as well as the blue, flowers magnificently every year.

Ixias are as hardy a perennial here as daffodils; *Crocsmia imperialis* runs about my shrubbery borders and comes up with its glorious orange blooms in October in all kinds of unexpected places, just like twitch grass; *Alstroemeria psittacina*, *Sparaxis pulcherrima*, *Scilla peruviana*, *Crinum capense*, the *Antholizas*, and several *Watsonias* (including even the lovely white *Watsonia Ardernei*) are quite hardy, and *Habranthus pratensis* also blooms every year; and as to lilies, I have had *Lilium giganteum* 10 feet high and with nineteen blooms on it.

We never lift our scarlet lobelias, nor our blue *Salvia patens* (except when shifting them), and the dahlias are often quite happy left out all

winter, and I have never happened to come across *Schizostylis coccinea* anywhere else equal to what I grow here in November and up to the beginning of December; one can see its masses of dazzling scarlet on my terrace from a boat sailing about in the bay.

Tigridias live out all the year, and some seasons they even seed themselves profusely, and I have seen the seedlings coming up thick in the gravel walks. In a good July I have seen the tea-roses on my lower terrace wall almost as good as on the Riviera, but the hybrid perpetuals do decidedly less well here, I think, than they do, for instance, in Hertfordshire, and florists' anemones and ranunculuses and also the Moutan Paeony have so far nearly defied me. On some of my lower walls I grow the Correas, and *C. alba* blooms the whole winter through, and is most charming. Callistemons (the scarlet bottle-brush) flower, and *Cassia corymbosa*, *Habrothamnus elegans*, and *Romneya* seem quite happy; *Abelia quinata*, *Lapagerias*, and *Mandevilla suaveolens* are growing, but have not yet bloomed with me.

Just one more remark, and that is about our rainfall. This is supposed to be a very wet part of the country, but according to my gardener, who keeps his rain-gauge very carefully, we had under 55 inches in 1907, whereas there are places in Britain where the fall is 180 and even 140 inches.

ACANTHACEAE.

WITH ANNOTATED LIST OF THE SPECIES KNOWN TO HAVE BEEN
IN CULTIVATION.*

By Colonel R. H. BEDDOME, F.L.S.

THIS order is almost entirely tropical; it consists of herbs and shrubs, no trees; our stoves are indebted to it for many beautiful plants; it is a great favourite with all botanists, as it is full of interesting genera and species; the flowers are generally showy; horticulturists pay much attention to many of the genera, especially *Aphelandra*, *Daedalacanthus*, *Eranthemum*, *Jacobinia*, *Crossandra*, and *Thunbergia*. For the amateur it is one of the three best orders (Rubiaceae and Gesneraceae being the other two). The chief reason for this is that every plant of this order grows most readily and quickly from cuttings; any plant therefore of the order, having been acquired, should never be lost or require repurchase; cuttings of almost every species should be inserted in the propagating frame between January and May, they root in a few days, and being well pinched in when in a young state, there are always nice young sturdy plants coming on to replace the old ones, many of which in a year or so become leggy and unsightly, only fit to be thrown away.

I have paid much attention to the order in the tropical field for many years, and have been cultivating the genera and species, as far as I have been able to procure them, since 1882, so I trust my notes may be of some service to horticulturists.

Acanthopsis

carduifolia, Clarke, "Fl. Capensis," vol. v. part i. p. 33. --Cape of Good Hope. Villous. Leaves 3 inches by $\frac{1}{3}$ inch, pinnatifid, doubly spinous-toothed; spike 2-3 inches by $\frac{1}{2}$ inch; bract $\frac{1}{2}$ inch long, obovate, truncate, crowned by 5 narrow lanceolate spines; bracteoles $\frac{1}{2}$ inch long, linear; calyx hairy; corolla $\frac{3}{4}$ inch long. Syn. *Blepharis carduifolius*, *Acanthus carduifolius*.

Acanthus.—Best known as almost the only genus in the order yielding hardy plants; it however contains a good many tropical species (e.g., *ilicifolius* and *volubilis*, plants not worth introducing, found in most tropical backwaters near the sea). I have not grown this genus (beyond *mollis*) or given much study to it. A list of the species introduced is, however, given.

candelabrum.—Garden form of *mollis*.

Caroli-Alexandri. "Gartenflora," 1886, p. 626 (fig. 78-75).—Greece. Leaves few, radical, in a lax rosette, lanceolate-pinnatifid, spine-toothed, 16 inches long, 8-4 inches broad; flowers white, often diffused with rose, in a dense spike. Quite hardy.

* The reference enclosed in brackets is to the best figure of the species.

hirsutus, Bois, "Diag." ser. 1, iv. 86.—Lydia Mountains. Leaves up to 15 inches long by 2 inches broad, lobed or pinnatifid; spike terminal, compact, ovate or oblong, about 6 inches long by 2 inches broad; bracts foliaceous, large, ovate, cucullate, toothed; corolla unilabiate, hirsute, pale yellow. Quite hardy.

hispanicus = **mollis** var. **niger**.

longifolius, Poir., "Enc. Supp." i. 88; (fig. Reich. "Ic. Pl. Ger." 1814).—Dalmatia. Radical leaves, 2-3 feet long; flowers purple in the axils of the bracts; bracts oval, acuminate, spiny, red; spike 1 foot long. Quite hardy.

lusitanicus = **mollis** var. **latifolius**.

mollis, Linn., "Sp. Pl." 639; (fig. Reich. "Fl. Ger." t. 1811).—Italy. Height 3-4 feet; leaves sinuate, unarmed, heart-shaped, 2 feet long by 1 foot broad; spikes $1\frac{1}{2}$ foot long; flowers white or rose, sessile in the axils of the deeply toothed bracts.

var. **latifolius**.—Only a variety, but larger and more robust. This is the form generally grown, and is much in evidence in many gardens, being valued for subtropical effects. It is the plant which suggested the decoration of the Corinthian columns.

var. **niger**, Mill., "Gard. Dic." ed. viii. 2.—Portugal. Leaves sinuate unarmed, glabrous, shining green; flowers purplish-white.

montanus, Anders., "Jour. Linn. Soc." vii. (1864), 37; (fig. "Bot. Mag." t. 5516).—Tropical Africa. About 3 feet high, glabrous or hairy; leaves spinous, up to 12 inches by 6 inches, pinnatifid half-way down, or lobate with spinous margins; spikes 3-1, terminal up to 10 inches long by 2 inches broad; calyx 1 inch long; corolla $1\frac{3}{4}$ inch, purple. Requires greenhouse culture.

Perringi, Siehe, "Gard. Chron." xxxvii. (1905), p. 2.—Asia Minor; 5,000 feet elevation. Leaves grey-green, sessile, 6 inches long, lanceolate, deeply toothed and notched, spinous; spike terminal; flowers handsome, rosy-red; bracts large, ovate, pointed, spinous; bracteoles narrow-lanceolate. A hardy species.

rigidus, Hort.—Garden form of **spinusus**.

Schottii, Hort.—A form of **mollis**.

spinusus, L., "Sp. Pl." 639.—South Europe. Height 3-4 feet. Leaves deeply and irregularly cut, each division terminating in a short spine; flowers purplish, spicate; sepals spiny. Hardy.

var. **spinosissimus**.—South Europe. Leaves lacinate-pinnatifid, blistered, spiny; flowers rose, sessile, on a spike with acute recurved bracts.

var. **rigidus**.—Garden form.

Adhatoda

cydoniaefolia, Nees in "Mart. Fl. Bras." ix. 148; (fig. "Bot. Mag." t. 4962).—Brazil. A well-known, pretty, stove, scandent plant with showy, white flowers, striped with purple. Very easily grown and flowered without any special treatment; not much subject to attacks of insects.

Vasica, Nees in "Wall. Pl. As. Rar." iii. 108; (fig. "Bot. Mag." t. 861).—India, where it is largely cultivated, particularly about temples. Shrub; leaves elliptic, shortly petioled; spikes axillary,

about length of leaves; flowers rather large, $1\frac{1}{2}$ inch; tube short, limb white, pink transverse reticulations on lower lip; calyx $\frac{1}{2}$ inch, 5-lobed.

Aechmanthera.—A Himalayan genus of only one species, Clarke's *leiosperma* being, I believe, a synonym.

tomentosa, Nees in "Wall. Pl. As. Rar." iii. 87.—Himalayas, 3,000–5,000 feet elevation. Syn. *Ruellia tomentosa*. A softly-woolly or villous undershrub. Leaves elliptic, hairy; panicles up to 1 foot long; flowers 3–8, clustered; bracts $\frac{1}{2}$ inch, linear, as long as calyx; calyx 5-lobed, segments linear, subequal; corolla 1 inch, tubular, ventricose, nearly straight, widened suddenly near the middle; segments 5, subequal, violet-purple.

Ancylogyne longiflora, see **Sanchezia longiflora**.

Anisacanthus

virgularis, Nees, DC. "Prod." xi. 445; (fig. "Rev. Hort." 1872, 50). Sometimes grown under the name of *Justicia quadrifida*.—Mexico. Leaves lanceolate, narrow; flowers axillary, solitary, long-tubed, nearly 2 inches, red. A very pretty plant for the intermediate house.

Wrightii, A. Gray, "Fl. N. Amer." ii. 928.—Texas and Oaxaca, Mexico; 500–8,000 feet elevation. Leaves oblong to ovate-lanceolate, acute, 1 2 inches long; spikes loosely paniced; calyx 5-cleft; corolla purplish-red, $1\frac{1}{2}$ inch long, the lobes shorter than the tube; very shy to flower.

Anisotes

diversifolius, Balf. f., "Proc. R. Soc. Edin." xii. (1883–88); (fig. Balfour, "Bot. of Socotra," t. xxiv).—Socotra. Leaves rotund or obovate, short-petioled; cymes short (about 1 inch), axillary, few-flowered; calyx $\frac{1}{2}$ inch; corolla reddish, $1\frac{1}{2}$ inch long; tube narrow, cylindric, bilabiate about half-way up from the base, slightly hairy; lobes reflexed, upper one entire, lower slightly trifid.

A curious little plant with honeysuckle-like flowers. Introduced lately by Mr. Lynch of the Cambridge Botanical Garden.

Anthacanthus.—This genus differs from *Eranthemum* chiefly in the much shorter tube to the corolla and in being furnished with spines.

jamaicensis, Gris., "Fl. West Ind." 457.—West Indies. A small, rather wiry, small-leaved plant, resembling a dwarf Box, with axillary, setaceous spines; flowers pedicelled, axillary, small, white, tube recurved, limb bilabiate, of 5 segments, the upper two rather smaller than the others. This was sent out by Mr. Bull under the name of *Eranthemum Hookeri* (an unpublished name, I believe), and it has been grown as such in various gardens. Rather a pretty little stove pot plant, somewhat in the way of *Eranthemum tuberculatum*, but very inferior to that plant.

Aphelandra.—A beautiful genus of showy stove plants. The species most commonly met with are **aurantiaca**, **Blanchetiana**, **Chamissoniana**, **Fascinator**, **squarrosa**, **nitens**, and **tetragona**. They require considerable heat to grow well, but flower

freely without any special treatment as to rest, &c. Their flowering time depends very much upon the time the cuttings are taken and the amount of heat given, &c.

acanthifolia, Hook. (fig. "Ic. Pl." t. 118).—Peru, Chacapoyas district. Pubescent; leaves up to 10 inches long by $3\frac{1}{2}$ inches broad, grossly serrate, petioles spinescent at the base; spikes terminal, aggregate, many-flowered, the ovate bracts and lanceolate calyx-segments spinous at apex; corolla $2\frac{1}{2}$ inches long, tubular, sericeous.

acutifolia, DC., "Prod." xi. 299; (fig. "Bot. Mag." t. 5789).—Peru, Colombia, Mexico. Leaves broad, oblong-ovate, 6-8 inches long, acuminate; spike terminal, sessile, erect, 6 inches long; bracts imbricate, $\frac{3}{4}$ – $1\frac{1}{2}$ inch long, ovate-oblong, sharply serrate; flowers $1\frac{1}{2}$ inch long, deep vermilion, the corolla lobes spreading, the lower one very broad. In the way of *aurantiaca*; a very handsome species.

amoena, Bull, "Cat. New Plants," 1885, p. 7=**Blanchetiana**.

atrovirens, N. E. Brown in "Ill. Hort." (fig. "Ill. Hort." xxxi. (1884), p. 107, t. 527).—Brazil. Leaves elliptic, blackish-green to violet-purple, often white-mottled on midrib and veins, purple underneath; spikes cone-like, small, terminal, sessile, subcylindric; flowers very small, yellow; bracts decussate, adpressed, green, 6 lines long, elliptic, acute, and serrate towards the apex; calyx small; corolla about $\frac{3}{4}$ inch long, tube erect. Handsome foliage, but not of much value as to flowers.

aurantiaca, Lindl., "Bot. Reg." 31, t. 12; (fig. "Bot. Mag." t. 4224); "Floral Mag." 517.—Mexico. Leaves rather large, dark green, ovate, wavy at margins; spikes terminal, 6 inches long; flowers large, dazzling orange-scarlet, produced from the ovate-acuminate, serrate, imbricated bracts; tube of the corolla almost entirely hidden in the bracts; upper lip erect, concave, 2-fid, lower one spreading, 3-lobed. Often represented in our hothouses.

var. **Roezlii** (fig. "Gartenfl." t. 608); "Flore des Serres," t. 1741 2.—Leaves dark green, shaded with white between the main veins, curiously twisted. Scarcely differing from the type.

Blanchetiana, Hook. f. (fig. "Bot. Mag." t. 7179).—Brazil. The largest species, erect, tall, very woody in age. Leaves 6-8 inches long, 2 – $2\frac{1}{2}$ inches broad, narrowed below into a winged petiole, silvery grey on each side of the midrib and main veins; spikes terminal, sessile, broad-oblong, about 8 inches long; bracts linear-oblong, $1\frac{1}{2}$ inch long, erect, patent, mucronate, slightly serrated near the apex or entire, red; flowers yellow, tube about length of bracts, slightly inflated just below the limb. Syn. *A. amoena*. Bull, "Cat." 1888, p. 7; *Strobilorrhachis Blanchetiana*. Common in cultivation.

bullata, H. Wendl. in "Hamb. Gartens," xix. 1863, 30.—Central America. Leaves ovate-oblong, acuminate, entire, of thick texture, bullate, main veins whitish, purple beneath; spike terminal, sessile, simple, tetragonous; bracts ovate-oblong, serrate, puberulous; corolla scarlet, puberulous.

carduifolia, Hook.=**formosa**, Nees.

Chamissoniana, Nees, "Mart. Fl. Bras." ix. 90; (fig. "Bot. Mag." t. 6627).—Brazil. Erect herb. Leaves elliptic, 8–4 inches long, with a broad white band along the midrib and sometimes partly along the main veins, but breaking up into numerous white dots towards the margin; spike terminal, sessile, broad; bracts yellow, green-tipped, $1\frac{1}{2}$ inch long, rather loose, recurved, very acuminate, margins spinous-toothed in their whole length; corolla yellow, tube $1\frac{1}{2}$ inch long. Syn. *A. punctata*, under which name it is generally found in our hothouses. A very beautiful plant.

chrysops, Bull, "Cat." 1887, 7, 9=**squarrosa**.

cristata, Lindl., "Bot. Reg." t. 1477=**tetragona**.

dubia.—Garden hybrid (fig. "Ill. Hort." xli. ser. 6, i. t. 15). Hybrid between *Aphelandra nitens* var. *Sinitzini* and *Stenandrium Lindenii*. Inflorescence as in *nitens*, foliage of *Stenandrium Lindenii*. In the way of *A. aurantiaca*.

Fascinator, Lind. (fig. "Ill. Hort." xxi. 1874, p. 42, t. 164).—Colombia. One of the most beautiful of the genus, but not always a good doer. Branches terete; leaves ovate to elliptic, beautifully streaked with silvery white along the midrib and main veins, purplish underneath; spikes terminal, simple, 4-sided; bracts erect, ovate, 2-seriate, acuminate, ciliate, small, not serrate; calyx small; corolla large, very showy, brilliant scarlet, tube exceeding the bracts, cylindric, erect, lobes spreading, large, the lower one very broad.

formosa, Nees, DC. "Prod." xi. 301; (fig. Hooker, "Ic. Pl." t. 718, as *carduifolia*).—Andes of Quito. Branches spinous. Leaves alternate, narrow oblong-lanceolate, acute, very short-petioled, grossly spinoso-serrate; flowers solitary in the axils of the upper leaves, which are gradually reduced in size; calyx bibracteolate; bracts spinous-pointed and spine-toothed on the margin; sepals like the bracts, but a little smaller; corolla tube trumpet-shaped, curved, $1\frac{1}{2}$ inch long, upper lip bifid, lower 3-lobed. A beautiful spinous species; the alternate leaves are unusual.

fulgens, Decne., "Rev. Hort." ser. iii. 1 (1847) (fig. p. 21).—Mexico. Leaves oblong or obovate-oblong, attenuated into the petiole, acuminate at apex, glabrous above, pubescent beneath; spikes 4-sided, bracts oval, acuminate, toothed, pubescent; calyx deeply cleft, the segments unequal; corolla scarlet, upper lip 2-lobed, erect, long, lower lobes reflexed.

glabrata, DC., "Prod." xi. 296=**Hydromestus**.

grandis, Hort. "Kew List." See **tetragona**.

Heydeana, J. D. Smith (fig. "Bot. Gaz." xviii. (1893), p. 210, t. 28).

—Brazil, Chupadero Dept., Santa Rosa; 5,000 feet elevation. Leaves nearly smooth except margins, ovate to elliptic, up to 8 inches by 3 inches, acuminate, contracted and prolonged at base; spike solitary, terminal, $1\frac{1}{2}$ inch long; bracts concave, nearly scarious, pubescent, obovate-oblong, with a recurved point at the apex, and 1–2 spine-like teeth on the margin; sepals elongate-lanceolate, nearly equalling the bracts; corolla glandular-pubescent, crimson, $2\frac{1}{2}$ inches long, posterior lobe quite entire, anterior

lobe as long, broadly obovate-oblong, with 2 small lobes at base. A very distinct species; the lower third of the leaf resembles a long, winged petiole.

Hydromestus, DC., "Prod." xi. 291; (fig. "Bot. Mag." t. 4556, as *maculatus*).—Mexico. Branches purplish; leaves glossy, elliptic oblong, 9-12 inches by 2-8 inches; spike terminal and axillary, 4 inches long, narrow; bracts 1 inch long, carinate, broad-ovate to obovate, sharply pointed, slightly serrate towards the apex, subcoriaceous, closely imbricate like the scales of a cone, in 4 series; flowers large, yellow, $1\frac{1}{2}$ inch, the curved tube well exerted beyond the bracts, funnel-shaped upwards; lobes large, spreading. Syn. *A. maculatus*, *A. glabrata*, *Strobilorrhachis prismaticus*, *Lagochilium Hydromestus*—see Hemslley, "Biol. Cent. Amer. Bot." 2. 512.

Leopoldii=*squarrosa* var. *Leopoldii*.

Liboniana, Lindley (fig. "Bot. Mag." t. 5463).—Tropical America. Leaves white-banded, about 9 inches long, suddenly acuminate, entire, petioles 2-3 inches long; spike terminal, about 6 inches long, narrow; bracts imbricate in 4 rows, bright orange, about $1\frac{1}{2}$ inch long, broad, ovate, the base concave; flowers small, yellow, red at the apex, nearly hidden in the bracts. Much in the way of *variegata*.

macedoiana, Lind. & Rod. (fig. "Ill. Hort." xxxiii. (1885), t. 583).—Brazil. Leaves elliptic-ovate, obtuse, $4\frac{1}{2}$ by $2\frac{1}{2}$ inches, dark green above, the midrib and veins margined with pale whitish-green, beneath purple; flowers not seen.

Macleayi, sp. n.—Glabrous. Leaves decussately opposite, green on both sides, 1-2 inches, lower ones up to 3 inches, long, ovate-elliptic, gradually acute at apex, margins entire, attenuated at the base into a short petiole, veins obscure above, an irregular zigzag white band down the midrib, under surface paler, veins prominent; spike terminal, strobiliform, cone-like, short, oval, somewhat 4-sided, $1\frac{1}{2}$ -2 inches long; bracts rather closely packed, $\frac{1}{2}$ inch long, green below, brown upwards, serrated towards the apex and then running into a long apiculus; calyx small, segments linear-filiform, whitish; corolla orange-scarlet, nearly 2 inches long, the lower cylindric portion of the tube $\frac{3}{4}$ inch, then curved and gradually expanding upwards, 2-lipped, upper lip shortly bifid and arched over the stamens, lower lip deeply 3-cleft, spreading and recurved.

A pretty, free-flowering species. I received this years ago from Sir George Macleay as *A. punctata* (there is a dried specimen unnamed from his garden in the Kew Herbarium). I have also met with it in stoves under the name of *squarrosa*. It, however, has nothing to do with either of these species (which both have yellow flowers), and as it appears to be undescribed, I have given a Latin description.* Its small leaves readily distinguish it from any other species.

* *A. Macleayi*, sp. n. Herba glabra; caule terete; foliis decussatis oppositis, petiolatis, oblongo-acutis, basi in petiolum angustatis, integerrimis, secus costam

maculata = **Hydromestus**.

Margaritae, E. Morr. (fig. "Belg. Hort." xxxiii. (1888), 315, t. 19); "Gard. Chron." ii. (1887), p. 585.—Brazil. Softly pubescent.

Leaves 5–6 inches long, 2 inches broad, elliptic, olive-green above, the main veins prominently white-banded, underneath purplish or red; spike terminal, short, bracts pectinate; flowers orange or yellow, well exserted. A very beautiful species.

mediaurata, Cogn. & March. (fig. "Pl. Ornem." (1878), t. 30).—Colombia. Leaves ovate-lanceolate, sinuate, bright green with yellowish central band; flowers not seen.

nitens, Hook. (fig. "Bot. Mag." t. 5741).—Guayaquil, Colombia. Leaves ovate, subacute, leathery, glossy-bronze above, purple beneath, 5–6 inches long, petiole $1\frac{1}{2}$ inch; spikes terminal, 6 inches long, narrower than in *aurantiaca*, tetragonous, with many imbricate, adpressed, subulate, slightly serrated, 1-inch long bracts; flowers large, scarlet. See also "Fl. des Serres," 981, and "Fl. Mag." 365. A very handsome species in the way of *aurantiaca*, but with most striking bronze-like foliage.

var. **Sinitzini** (fig. "Ill. Hort." xxiii. t. 281) only differs from the type in the main veins being white-banded.

ornata, Anders., "Journ. Bot." ii. (1864), 289; (fig. "Belg. Hort." 1865, t. 93); "Gard. Chron." ii. (1887), 585.—Brazil, prov. Bahia. Leaves elliptic, 8–10 inches long, with a large, broad, pale band down the centre; petioles and flower-stalks reddish; spike terminal, 6 inches long; bracts large, ovate, acuminate, hairy, tinged purplish; flowers large, yellow, tube long, well produced beyond the bracts. Nearly allied to *Hydromestus*.

pectinata, DC., "Prod." xi. 297.—South America, Mexico, St. Vincent. Leaves ovate to elliptic-oblong, acute, attenuated into the petiole, pubescent beneath; spikes terminal; bracts ovate, cuspidate, pubescent, serrated towards the apex; corolla 2 inches long, pubescent, 2-lipped, the upper one bidentate, bi-appendiculate near the base, the lower acuminate, revolute.

Porteana, Morel (fig. "Fl. des Serres," ser. i. x. (1854–5), 41, t. 984).—Brazil. Leaves large, lanceolate-oblong, cuspidate, decurrent into the petiole, white-banded along the midrib; flowers in a broad, terminal head; bracts orange, broadly obovate, subacute at the apex; corolla yellow, half of the curved tube hidden in the bracts.

var. **clava**, Morel (fig. "Wawra Reise Max." t. 614).—Spike terminal, short, oval, 8 inches long by $1\frac{1}{2}$ inch in diameter; bracts large, spatulate, spinous-acute, red; corolla yellow, 2 inches long, tube hidden in the bracts.

prismatica = **Hydromestus**.

albidis, 1–2 poll. longis, infer. interdum usque ad 3 poll.; nervis subtus crassis, supra subobsoletis; spica terminali, sessili, tetragona, $1\frac{1}{2}$ –2 poll. longa; bracteis imbricatis, ovali-oblongis, longissime acuminatis, $\frac{1}{2}$ -poll. longis, infra viridibus, supra fuscis, apice versus serratis; flores rubri fere 2-poll. longi, corolla glabra, tubus incurvus infra cylindricus supra gradatim ampliatus, limbus 2-labiatus, labio postico breviter 2 lobo, arcuato, labio antico 8-lobo, reflexo-patente.

pumila, Bull, "List of New Plants," No. 148, 1878, p. 4; (fig. "Bot. Mag." t. 6467).—Brazil. A low-growing species. Leaves large, cordate, ovate-oblong, acute; spike 8 inches long; bracts large, closely adpressed, dull purple; corolla $1\frac{1}{2}$ inch long, orange-scarlet, much exceeding the bracts, tube slender, slightly curved, arched at top.

var. **splendens** (fig. "Gartenfl." 1104).—Bracts acute, green.

punctata, "Gartenfl." (1882), 184=**Chamissoniana**.

Roezlii=**aurantiaca** var. **Roezlii**.

Sintzini=**nitens** var. **Sintzini**.

squarrosa, Nees, "Mart. Fl. Bras." ix. 89.—Brazil. Leaves crowded, elliptic, acuminate, about 10 inches long, often white-banded; spikes terminal, solitary, or ternate; flowers yellow or orange, $1\frac{1}{2}$ inch long; bracts 1 to $1\frac{1}{2}$ inch long, yellow or orange, densely imbricate.

var. **citrina** (fig. "Fl. des Serres," 809).—Bracts of a beautiful citron colour.

var. **Leopoldii**. (fig. "Fl. des Serres," 889).—Midrib and main veins pure white, underneath pale green; flowers yellow, nearly hidden in the bracts; bracts red, broad-obovate, obtuse, crenate or serrate chiefly towards the apex, or entire. Syn. *A. chrysops*.

var. **Louisae**. "Kew List."—Leaves narrow elliptic, midrib and main veins beautifully white-banded.

This species and its varieties are rare and beautiful stove plants.

sulphurea, Hook. (fig. "Bot. Mag." t. 5951).—Guayaquil, Ecuador. Leaves 6-9 inches long, elliptic to ovate, abruptly acuminate; petioles $\frac{3}{4}$ inch, stout; spike 5-8 inches long, terminal, erect; flowers yellow, bracts 1 inch long, ovate-lanceolate, acute, slightly toothed towards the apex, imbricate; corolla tube curved, half hidden in the bracts, lobes spreading, $1\frac{1}{2}$ inch across, upper lip erect, narrow, convolute, lower of 3 lobes, the middle one broad with a red spur at base. In the way of *aurantiaca*, but flowers yellow. Introduced by Messrs. Veitch.

tetragona, Nees, DC. "Prod." xi. p. 295; "Bot. Reg." t. 1477; (fig. "Bot. Mag." t. 1578).—West Indies. A rather straggling, tall-growing species. Leaves large, broadly ovate, tapering to a point; spikes terminal and axillary, often densely aggregated, tetragonous, 4-6 inches long; bracts small, ovate; sepals a little longer than the bracts; flowers bright scarlet, 2-3 inches long, tube arcuate. Syn. *A. cristata*. Very common in cultivation.

var. **imperialis** (fig. "Gartenfl." 1854).—Spikes terminal; flowers scarlet, four times as long as the brownish bracts.

var. **grandis**.—Venezuela. Leaves nearly 1 foot long, 4 inches broad, with a long tail-like point; spikes crowded, terminal; rachis woolly.

variegata, Morel, "Fl. des Serres," ser. i. x. (1854-5), 38, t. 981; (fig. "Bot. Mag." t. 4899).—Brazil. Leaves very short-petioled, ovate-lanceolate, acuminate, dark green with white veins; spikes 8 inches long, terminal, narrow; flowers small, yellow; bracts carinate, oblong, entire, blunt, orange; corolla tube nearly hidden

in the bracts; calyx 5-parted, lobes nearly equal. Nearly allied to *Liboniana*.

A. formosa, DC. (*carduifolia*, Hook. "Ic. Pl." t. 718), is now lost to cultivation, **lyrata**, DC. "Prod." xi. 802, Colombia, and **runcinata**, DC. "Prod." xi. 802, Colombia, all belonging to the spinous-leaved section, would be welcome introductions to our hothouses.

Asystasia

bella, Hook., "Gen." ii. 1095; (fig. "Bot. Mag." t. 5797).—South Africa. A well-known beautiful shrubby plant for intermediate house or conservatory. Lovely lilac flowers delicately reticulated with purple lines, in many-flowered racemes. When planted out in a house, well out back after flowering, rested for a time in the early autumn and then well fed, it flowers profusely in May and June. It can also be grown in pots, treated as above, but it does not then flower quite so well as when planted out. Syn. *Mackaya bella*, under which name it is generally met with.

chelonoides, Nees, DC. "Prod." xi. 164.—India and Ceylon. Straggling habit; leaves elliptic, entire, sub-glabrous, up to 4 inches long by $1\frac{3}{4}$ inch broad; racemes compound, many-flowered, the lower pedicels longer than the calyx; corolla $\frac{3}{4}$ inch, purple. Closely allied to *coromandeliana*.

coromandeliana, Nees in "Wall. Pl. As. Rar." iii. 89.—India. A straggling herbaceous plant. Racemes about 5 inches long; flowers $1\frac{1}{4}$ inch long; the upper inflated portion of the tube much longer than its cylindric base, white to pinkish. Rather a weedy subject; answers well round a hanging-basket, admirable for covering a wall over which peat has been wired in, as it flowers all the summer.

macrocarpa, Nees, DC. "Prod." xi.—Himalayas up to 4,000 feet elevation. A rambling plant; leaves oblong or elliptic, up to nearly 5 inches long by $1\frac{3}{4}$ inch broad; racemes usually condensed, 1-sided, sometimes lax, erect, 3-4 inches long; flowers dull pink, corolla-tube $1\frac{1}{4}$ inch long, ventricose upward from a very short cylindric base.

scandens, Hook. (fig. "Bot. Mag." t. 4449).—Sierra Leone. Scandent or straggling shrub. Racemes terminal, with many large cream-coloured flowers; calyx of 5 small, linear, ciliate, equal sepals; corolla slightly hairy, tube curved, the narrow cylindric portion as long as calyx, then enlarging and spreading into 5 large lobes. A very fine stove species.

violacea, Dalz. in "Fl. Brit. Ind." vol. iv. 494; (fig. "Bot. Mag." t. 4248 as *coromandeliana*).—India, Western Ghats up to 6,000 feet elevation. Leaves sub-ovate, sub-glabrous, up to about 7 inches long by 8 inches broad; racemes compound, many-flowered, the lower pedicels shorter than the calyx; flowers large, violet-blue, $1\frac{1}{2}$ inch long.

Barleria.—A neglected genus rarely met with in our houses; there are, however, some very beautiful species.

cristata, L., "Sp. Pl." 636; (fig. "Bot. Mag." 1615).—India. Leaves lanceolate, entire; flowers axillary; calyx of 4 sepals, the two outer ovate, acuminate, pectinate, the two inner awl-shaped; corolla funnel-shaped, tube long, straight; flowers violet with paler spots.

flava, Jacq., "Ecl." 67, t. 46; (fig. "Bot. Mag." t. 4113).—Arabia. Spikes terminal, ovate, with numerous bracteated yellow flowers; calyx of 4 sepals, the two larger ovate, acute, nerved, serrate, ciliate; corolla infundibuliform, the tube rather short, but longer than the calyx. See also "Bot. Reg." 3, t. 191. Common in cultivation.

Gibsoni, Dalz., "Kew Jour. Bot." 2, 339; (fig. "Bot. Mag." t. 5628).—India, Western Ghats. Leaves lanceolate, 2-4 inches long; flowers in short spikes, terminal or from the upper axils; calyx $1\frac{1}{2}$ inch long, outer sepals narrow-subulate, not half the length of the inner, which are oblong, obtuse, convex, and nerved; corolla large, $2\frac{1}{2}$ inches long, pale bluish-purple, tube as long as calyx, funnel-shaped; seeds glabrous. A very fine species formerly in cultivation at Kew.

involutrata, Nees, "Wall. Pl. As. Rar." iii. 92; (fig. Wight, "Ill." t. 164).—India, Western Ghats. Leaves elliptic, long-petioled; racemes axillary, few-flowered; calyx, 2 outer sepals 1 inch long, narrow-lanceolate, very acuminate, strongly nerved, inner ones linear, small; corolla tube 2 inches long, blue. A species with large handsome flowers.

Lichtensteiniana, DC. "Prod." xi. 235; (fig. "Gard. Chron." 1873, p. 73).—S. Africa. Shrub; leaves opposite, linear-lanceolate, entire, mucronate, 2 inches long; spikes axillary, 3 inches long, ovoid; bracts closely packed, ovate, mucronate, spine-toothed, $1\frac{1}{2}$ inch long; corolla brownish, tube dilated at base, contracted just below the apex, lobes 5, short, erect, ovate.

longifolia, L., "Suppl." 200 = **Hygrophila spinosa**.

lupulina, Lindl. (fig. "Bot. Mag." t. 1483).—Mauritius; cultivated and run wild in India. Leaves narrow-lanceolate, spinous in the axils; spikes terminal, short, oval (like those of the hop); flowers yellow, 1 inch long, tube straight; bracts ovate, concave, imbricate.

Mackenii, Hook. (fig. "Bot. Mag." t. 5866).—Natal. Flowers few, solitary in the upper axils, purple; calyx, outer sepals 1 inch long and about as broad, broadly ovate-cordate, obtuse; corolla tube funnel-shaped, shorter than the outer sepals, limb 2 inches across, flat. A very fine species.

Prionitis, DC., "Prod." xi. 237; (fig. Wight, "Icones," t. 452).—S. India. A small shrub, very prickly; leaves elliptic, acuminate at both ends, spine-tipped, sub-glabrous; flowers axillary, 1-3, upper ones spiked; bracts large, elliptic, spine-tipped, bracteoles very small; corolla yellow, $1\frac{3}{4}$ inch long. Of botanical interest only.

repens, Nees, DC. "Prod." xi. 230; (fig. "Bot. Mag." t. 6954).—Tropical East Africa. A prostrate plant. Leaves elliptic to obovate, up to $2\frac{1}{2}$ inches long; flowers pink, axillary, solitary; sepals 4, the two outer $\frac{3}{4}$ inch long, ovate, ciliate, entire, reticulated, two inner small, subulate; corolla 2 inches long, tube funnel-shaped.

strigosa, Willd., "Sp. Pl." iii. 379.—India, and much cultivated there. Leaves ovate, decurrent on the petioles; spikes very dense, many-flowered, 1–3 inches long, always secund; outer sepals 1 inch long, nerved, ovate, ciliate, strigose; flowers 2 inches long, blue.

tomentosa, Roth., "Nov. Sp. Pl." 314.—South India. Leaves elliptic; racemes 1–3-flowered; calyx, outer sepals $1\frac{1}{2}$ inch long, oblong, acute, entire, scarious, purple-veined, two inner half as long; flowers rose-coloured, tube 2 inches long, funnel-shaped upwards.

Barleria montana, Nees, "Wall. Pl. As. Rar." iii. 92 (fig. Bedd. "Ic. Pl. Ind. Or." t. 257), and **B. grandiflora**, Dalz. ex Hook. "Kew Jour." ii. (1850), 339—both from the Western Ghats in India—are well worth introducing into our conservatories on account of their very fine flowers; the latter has flowers $4\frac{1}{2}$ inches long. **B. noctiflora**, L. "Supp." 290, from the dry plains about Coimbatore (not Nilgiris, as stated in "Flora Indica"), and **B. longiflora**, L. "Supp." 239, with very long-tubed flowers, from the plains of Tinnevely, are very interesting and attractive species that might well grace our conservatories. There could not be much difficulty in procuring the seed of these four species.

Barleriola

solanifolia, DC., "Prod." xi. 242.—San Domingo. Leaves oval-oblong, angularly dentate, entire, glabrous; flowers axillary, sessile, ternate; bracteoles lanceolate, subulate, subspinescent; flowers pale rose, corolla tube narrow-filiform, $\frac{1}{3}$ inch long, lobes obovate, cuneate, subequal.

Beloperone

angustiflora, Stapf in "Kew Bull." 1908, i. p. 20.—Tropical America. Small herb. Leaves opposite, decussate, linear to lanceolate, midrib above strigose with close-pressed hairs; spikes terminal, nearly 1 inch long, strobiliform; bracts ciliate with long hairs, the outer ones broad-obovate, inner narrow-linear; flowers violet-pink, about 1 inch long, tube curved, linear, widening just below the apex, limb bilabiate, the upper lobe emarginate, lower 3-parted, a white pinnatifid mark down the centre of the middle lobe. Scarcely of more than botanical interest, but several plants in a small pot make rather a pretty show. It comes up self-sown all over one of my stoves.

atropurpurea, Nees in "Mart. Fl. Bras." ix. 135.—Brazil. Leaves oval, 6–7 inches long, 3 inches broad, subsessile; flowers in a terminal, elongated thyrses, purple-coloured.

oblongata, Lindl. (fig. "Bot. Reg." t. 1657).—Brazil. Spikes axillary, short-peduncled, 2-3-flowered, shorter than the leaves; calyx 5-parted; sepals equal; corolla $1\frac{1}{2}$ inch long, rose-coloured, tube erect, limb 2-lobed. A pretty pot plant with showy flowers.

plumbaginifolia, Nees, "Wall. Pl. As. Rar." iii. 102.—Brazil. Leaves ovate-oblong, long-petioled; spikes 1 inch long, terminal trifid, bracts linear; flowers $\frac{1}{2}$ inch long, purple.

violacea, Planch. & Linden, "Hort. Lind." i. 5, t. 3; (fig. "Bot. Mag." t. 5244).—Colombia. A pretty stove plant. Leaves short-petioled, ovate; flowers in a terminal, capitate spike; calyx 5-fid, segments equal; corolla twice as long as calyx, purple, ringent, bilabiate, upper lip arched over the stamens, very slightly bifid, lower lip of 3 large spreading lobes, the lowest white-reticulated; bracts oblong.

Blepharis.—Plants of this genus are of botanical interest only.

boerhaviaefolia, Pers., "Syn." ii. 180; (fig. Wight, "Icones," t. 458).—S. India. Prostrate herb. Leaves usually 4 in a whorl, elliptic, repand-toothed, nearly glabrous; spikes axillary, few-flowered; bracts $\frac{1}{3}$ inch, ovate, bristle-ciliate; bracteoles $\frac{1}{2}$ inch, spathulate, bristle-ciliate, sub-glabrous, green-nerved; corolla $\frac{3}{4}$ inch, pink or whitish.

capensis, Pers., "Syn." ii. 180.—South Africa. A small harsh shrub, nearly glabrous; stem-leaves generally approximated in fours, the lower pair of which is reduced to pinnately toothed spines, the upper pair $1\frac{1}{2}$ inch long, oblong-elliptic, spine-toothed; spikes near the end of the branches, loose, 4 9-flowered; bracts 1 inch long, elliptic-lanceolate, glabrous, white-nerved; corolla $\frac{3}{4}$ inch long, white.

furcata, Pers., "Syn." ii. 180.—South Africa. Very spinous. Leaves $1\frac{1}{2}$ inch long, lanceolate or linear, with spinous teeth; spikes axillary, 1 inch long, ovoid, few-flowered; bracts $\frac{3}{4}$ inch long, nearly glabrous, terminating in a rigid, pinnate spine; corolla $\frac{3}{4}$ inch long, bluish.

glomerata = **procumbens**.

procumbens, Pers., "Syn." ii. 180.—South Africa. Leaves generally approximated in fours, sub-similar, about 1 inch long, linear to linear-oblong, deeply toothed, spinous; spikes axillary, ovoid, $1\frac{1}{2}$ inch long, few-flowered; bracts 1 inch long, ovate, acute, with recurved points, hairy-spinous on the margins; corolla about 1 inch long, blue.

Brillantaisia

Lamium, DC., "Prod." xi. 97.—Tropical Africa. A rather weedy herb. Stems soft, 4 sided; leaves broadly ovate, entire; panicles terminal, trichotomous; calyx 5-parted, sepals narrow, equal; corolla dark purple, rather large, deeply 2-lobed, upper lip bifid, arching over the stamens, with a membranous hinge at the base, lower lip deflexed, 2-lipped. If well pinched in when young to prevent its lanky growth, it is rather a pretty pot plant for the stove, as the flowers are showy and curious with the remarkable

hinge. Introduced accidentally into my stove-houses with other seed or plants, it now sows itself considerably.

leonensis, Burkett (fig. "Bot. Mag." t. 4717, *owariensis*, except the dissections).—Tropical Africa. Leaves broadly ovate, cordate, shortly acuminate, regularly serrate, softly hairy, petiole winged above; panicle terminal, rather close, glandular-pubescent; calyx segments linear, glandular-pubescent, the posterior one longer than the others and a little broadened at the apex; flowers violet-blue; corolla tube short, the lobes 10 lines long, the upper one hairy on the outside. Differs from *Lamium* in its markedly serrated leaves and in its calyx segments.

Chaetothylax

eustachiana, Vahl, "Symb. Bot." ii. 15, as *Justicia*; "Bot. Reg." t. 309; (fig. "Bot. Mag." t. 2076).—West Indies. Leaves ovate, acuminate, crenate; spikes axillary and terminal, short, subverticillate; bracts linear-lanceolate; flowers orange; corolla bilabiate, cut halfway down, upper lip 3-cleft, lower very shortly bifid; tube funnel-shaped, slightly curved, contracted only at the very base. Syn. *Justicia eustachiana*.

Chamaeranthemum.—A genus grown chiefly for its foliage. Very like *Eranthemum*, only it has four stamens.

Beyrichii, Nees in "Lindl. Nat. Syst." ed. ii. 445; (fig. "Bot. Mag." t. 5557).—South Brazil. A slender herb. Leaves ovate-oblong, variegated with white; panicles erect, many-flowered; corolla white, $1\frac{1}{2}$ inch in diameter; tube slender, slightly curved. See also "Gartenfl." 1867, 535.

Gaudichaudii, Nees in "Mart. Fl. Bras." ix. 155; (fig. "Fl. des Serres," 1767).—Leaves ovate, subcordate, dark green, all the centre part clouded with silvery grey; spikes terminal, solitary or ternate; flowers small, inconspicuous. A pretty foliage plant.

igneum, Regel. (fig. "Gartenfl." 1868, 598).—Peru. Very dark green leaves with golden veins and midrib; spikes small; flowers inconspicuous, yellow, funnel-shaped. Grown only for its very beautiful foliage. See also "Fl. des Serres," 1722. Syn. *Stenandrium igneum*, "Ill. Hort." 1877, 266.

pietum, Masters, "Gard. Chron." 1878, i. 527.—Brazil. Leaves sessile, obovate, shortly acuminate, covered with orange-coloured hairs when young, at length glabrous, green with orange edges and a central irregular silvery blotch, up to 9 inches long by 4 inches broad; flowers not seen. A pretty foliage plant.

Crossandra

flava, Hook. (fig. "Bot. Mag." t. 4710).—Tropical West Africa. Leaves about 9 inches long, lanceolate, undulate, upper ones sessile, lower petioled; spike terminal, short, erect, strobiliform; bracts round, large, submembranous, yellow-green, very hairy, acutely keeled, the margins spinulose; calyx concealed in the bracts; corolla bright yellow, glabrous, tube much exerted, geniculate about the middle, limb of 5 flat lobes.

guineensis, DC., "Prod." xi. 281; (fig. "Bot. Mag." t. 6346).—Tropical West Africa. Leaves ovate, glabrescent, obtuse, margin

undulate, base narrowed, reticulated with pink ; petiole $\frac{1}{2}$ inch ; spike solitary, sessile, 4 inches long, many-flowered ; bracts $\frac{1}{2}$ inch long, imbricate, lanceolate, green, hard and coriaceous, pungent pointed ; flowers pale lilac ; corolla tube slender, incurved, $\frac{2}{3}$ inch long, lobes $\frac{1}{2}$ inch, obovate. A very beautiful pot plant, the leaves beautifully reticulated with pink lines like a *Fittonia*.

mucronata, Lindau (fig. "Bot. Jahrb." xx. (1894), 85, t. 85).—Tropical West Africa. Leaves oblong-lanceolate ; inflorescence densely spicate, long-peduncled ; bracts $\frac{2}{3}$ inch long, obovate, narrow at the base, mucronate at the rounded apex, 5-nerved, lower segment of calyx bifid. Scarcely of more than botanical interest.

undulaefolia, Salisb., "Par. Lond." t. 12 ; (fig. "Bot. Mag." t. 2186).—South India, where it is much cultivated, particularly about temples. Spikes linear, axillary, about 4 inches long, densely bracteate ; bracts about $\frac{1}{2}$ inch long, elliptic, acute ; flowers large, sessile, showy, orange-coloured, tube about 1 inch long, linear-incurved, limb all on one side, 5-lobed. In Ceylon there is a yellow-flowering variety which I have not seen in cultivation. A most useful and showy pot plant for the stove, flowering most freely ; it should be propagated annually from cuttings after flowering, the old plants being thrown away ; if pieces of the stem are inserted in the propagating frame they send off side shoots which will root readily and form nice plants.

Cystacanthus

turgidus, Nichols., "Dict. Gard." i. 428 ; (fig. "Bot. Mag." t. 6048). Cochin China. Syn. *Mennia turgida*. Leaves opposite, elliptic, 4-7 inches long, glabrous ; flowers paniced, showy, white, reticulated with pink lines, throat yellow. A pretty pot plant.

Daedalacanthus

macrophyllus, Wall., "Cat." 7179 ; (fig. "Bot. Mag." t. 6686).—Burma. Spikes long, linear, erect, subinterrupted ; bracts elliptic, imbricated ; corolla $1\frac{1}{2}$ inch long, very pale blue ; limb $\frac{3}{4}$ inch in diameter. Common in many stoves ; very inferior to *nervosus*.

nervosus, Vahl, "En." i. 164 ; (fig. "Bot. Mag." t. 1358).—India. Spikes short, 1-3 inches long, subinterrupted, often ternate in terminal panicles ; bracts $\frac{1}{2}$ inch, elliptic, concave, margins entire, not ciliate, not much acuminate, imbricated ; calyx $\frac{1}{4}$ inch, whitish ; corolla $1\frac{1}{2}$ inch, dark blue. A very useful winter-flowering stove plant, very much grown.

roseus, Vahl, "En." i. 165, as *Justicia* ; (fig. "Ill. Hort." xxiii. 285).—South India mountains. Spikes linear, lax, 5-6 inches long subinterrupted ; bracts obovate with a short recurved mucro, glandular-pubescent, strongly nerved ; flowers $1-1\frac{1}{2}$ inches long, rose-coloured. A very pretty species, rare in cultivation.

strictus, Roxb., "Fl. Ind." i. 114 ; (fig. "Bot. Mag." t. 8068) ; "Bot. Reg." t. 867.—North India. Spikes linear, interrupted, forming a large, terminal panicle ; bracts narrow, elliptic, obtuse ; corolla about 2 inches long, blue.

Wattii, Bedd. in "Gard. Chron." (1901), 644.—North India. Often met with under the name of *parvus*, a later name given by

Mr. Clarke (in ignorance that it had already been named). Allied to *nervosus*, but a much smaller species, flowering in the summer and early autumn. Flowers a rich deep purple. It should be grown every spring from cuttings, as these flower much better than the old plants, which also soon get unsightly. It has a habit of sometimes producing very small abortive flowers, a trick common also with *Eranthemum cinnabarinum*. High cultivation and feeding is the only cure for this.

Dianthera

americana, Linn., "Sp. Pl." 27; (fig. "Bot. Mag." t. 2367).—North America. Syn. *Justicia pedunculosa*. Leaves linear-lanceolate; spikes on very long peduncles, axillary, few-flowered; flowers small. Of botanical interest only.

bullata, N. E. Brown (fig. "Ill. Hort." xxxiii. (1886), 589).—Borneo. Leaves opposite, short-petioled, elliptic, bullate between the veins, purple beneath; racemes terminal; flowers small, fascicled in the axils of the bracts; calyx 1 line long, 5-lobed; corolla 2 lines long, tube cylindric, limb bilabiate, upper lip oblong, concave, entire or slightly bidentate, lower trifid. Of botanical interest only.

ciliata, DC., "Prod." xi. 331; (fig. "Bot. Mag." t. 5888).—Panama, Chili, and Venezuela. Leaves lanceolate; flowers axillary and terminal, sessile in shortly peduncled fascicles; bracts subulate, ciliate, exceeding calyx; calyx 5-parted, segments subulate, ciliate, half as long as corolla; corolla violet with white palate, tube $\frac{3}{4}$ inch long, cylindric, upper lip small, recurved, bifid, lower lip deeply 3-lobed, $1\frac{1}{2}$ inch in diameter, flat. See Masters, "Gard. Chron." 1870, p. 1567. A pretty winter-flowering stove plant.

nodosa, Benth. & Hook., "Gen. Pl." ii. 1113; (fig. "Bot. Mag." t. 2914, as *Justicia nodosa*).—Brazil. Stems swollen at the joints; leaves ovate, acuminate, glabrous, very short-petioled; racemes short, axillary, 2-3-flowered; bracts several at the base of each flower, linear-filiform; calyx 5-lobed; corolla large, handsome, pale crimson, tube very long, thickened upwards and then bilabiate, lobes long, upper one erect, linear, emarginate, lower deflexed, 3-lobed. A pretty pot plant, now fairly common in our stoves.

pectoralis, Gmel., "Syst." 36.—West Indies, Mexico, and Brazil. Glabrous; leaves lanceolate, acuminate; spikes elongate, branched; flowers distant, mostly 1-sided, about $\frac{1}{2}$ inch long; calyx segments 5, small, linear, about one-fifth the length of the corolla; corolla 2-lipped, divided about a quarter down, upper lip ovate, entire. •

secunda, Griseb., in "Goet. Abh." vii. (1857), 246; (fig. "Bot. Mag." t. 2060).—West Indies. Leaves elliptic, attenuate at apex; racemes terminal, secund, loose, many-flowered; bracts setaceous; flowers pinkish-red, bilabiate to nearly the base, upper lip very shortly bifid, lower lip obsoletely 3-toothed. Syn. *Justicia geniculata*, "Bot. Mag." t. 2487; *Justicia lucida*, "Bot. Mag." t. 1014.

Dicliptera

Tweediana, DC., "Prod." xi. 482; (fig. "Rev. Hort." 1874, t. 171).—Buenos Ayres. Leaves opposite, attenuate at both ends;

racemes terminal; flowers bright scarlet, numerous, verticelled in compound heads towards the end of the peduncles; corolla-tube $1\frac{1}{2}$ inch long, slightly enlarging near the apex, where it is 2-lipped; upper lip entire, lower slightly 3-fid. A very pretty plant for greenhouse culture.

Dyschoriste

Hildebrandtii, Clarke, "Fl. Trop. Africa," v. 76; (fig. "Bot. Mag." 7978).—Tropical Africa. A small free-flowering plant with a peculiar odour; leaves elliptic, 1 inch long, silvery, obscurely crenate, petioles short; cymes axillary, small, 8-10-flowered; bracteoles linear, small; calyx glandular-pubescent, $\frac{1}{2}$ inch, divided two-thirds down; corolla 2-lipped, $1\frac{1}{2}$ inch, pale purple, cylindric portion of the tube $\frac{3}{4}$ inch. Syn. *Calophanes Hildebrandtii*, S. Moore. An interesting pot plant for stove.

oblongifolia (fig. G. Don in "Sweet Flow. Gard." t. 181).—North America. Stems 4-angled; leaves oblong to obovate or spatulate, entire, short-petioled; flowers axillary, solitary, short-peduncled, azure-blue, the lower lobe with purple spots; calyx of 5, subulate, short segments; corolla longer than calyx, funnel-shaped, ventricose, and subcampanulate, lobes rounded, nearly equal. Syn. *Calophanes oblongifolia*. This dwarf perennial is hardy; it is a pretty border plant.

Ebermaiera

nitida, Reich., "Gard. Chron." 1879, i. 812.—Brazil. Stemless; leaves glossy, nearly glabrous, convex, elliptic, cordate at base; spikes elongate; flowers small, alternate; corolla-tube slightly curved, limb sub-bilabiate, lower lobe 2-lobed. Syn. *Chamaeranthemum nitidum*, under which name it was sent out by Mr. Bull. Only of botanical interest.

Ecbolium

Linneanum, Bois., "Fl. Orient." iv. 526; (fig. "Bot. Mag." t. 1847).—South India and Ceylon. Leaves petioled, ovate, entire; spikes terminal, dense, $2\frac{1}{2}$ inches long; bracts large, imbricate, ovate, obtuse; corolla greenish-blue, tube 1 inch long, subfiliform, limb 2-lipped, upper lip narrow, slightly bifid, lower 3-lobed. A curious and interesting plant, sometimes met with in our stoves. Scarcely of more than botanical interest.

Eranthemum.—A genus yielding many stove plants beautiful both in their flowers and foliage. They all, of course, grow most readily from cuttings. Scale seems to be fonder of this genus than of any other, and plants must be almost daily looked over to keep them free from it. If there are ants in a house they are always busy on the plants, carrying the scale about.

acuminatissimum, Miq., "Fl. Ind. Bat." ii. 885; (fig. "Bot. Mag." t. 5771, as *E. Andersoni*).—Malay Peninsula. Leaves large, lanceolate, attenuated, and acuminate; spike terminal, long, linear; the flower clusters whorled, below many-flowered, above few-flowered; corolla white, pubescent, the tube about $1\frac{3}{4}$ inch long, linear-cylindric, lobes 5, the lower one dotted with crimson. Syn. *E. Andersoni*, Masters in "Gard. Chron." 1869; *E. elegans*, Masters, l.c. 1868, p. 1284.

A very fine species, long grown under the name of *Andersoni*, but lately identified as Miquel's *acuminatissimum*.

albiflorum, Hook. (fig. "Bot. Mag." t. 4225).—Solomon Islands. Leaves oval to oblong, sessile, glabrous, entire; flowers pure white, in terminal spikes. A very pretty free-flowering stove plant, common in cultivation.

aspersum, Hook. (fig. "Bot. Mag." t. 5711, and t. 1423 as *bicolor*).—Solomon Islands. Leaves small, ovate; cymes axillary, shorter than the leaves, few-flowered; flowers white, all 5 lobes pink, dotted with a bright carmine patch on the lower lobe; tube very slender, cylindric, five times as long as the calyx. A very pretty stove plant, common in cultivation and very free-flowering; cuttings should be rooted every spring and well pinched in several times, otherwise the plants grow leggy and unsightly.

atropurpureum, Bull. "Gard. Chron." ser. 2, vol. iii. (1875), 619; (fig. "Bot. Mag." t. 7839).—Pacific Islands. Leaves blackish purple, 4-6 inches long, ovate or oblong; racemes terminal, 8 inches long, erect, spike-like, branches short, many-flowered; corolla-tube 1 inch long, straight, slender; lobes linear-oblong, obtuse, white, rose-spotted at the base; 2 upper erect, 3 lower deflexed. Syn. *E. nigrescens*, Bull; *E. nigrum*, Lind., "Ill. Hort." t. 404. Sent out by Mr. Bull in 1875.

I have occasionally seen this in flower. Its long handsome panicle of flowers is very showy, but the plant is generally very leggy; to get it to flower it must be grown on rapidly in great heat and well fed. It is more useful as a small foliage plant for the sake of its almost black leaves. Tops and side shoots should be constantly taken off and rooted. It never flowers under these conditions. In time it becomes leggy and unsightly, the top is then taken off and the old stem will send off fresh shoots, which also make good cuttings.

Beyrichii = **Chamaeranthemum Beyrichii**.

borneense, Hook. (fig. "Bot. Mag." t. 6701).—Borneo. Leaves 4-6 inches, short-petioled, ovate, oblong, acuminate, glabrous; spike 4-6 inches long, stout, erect; flowers crowded round the rachis, white, the lower lobe yellowish, tube 1 inch long cylindric; limb about $1\frac{1}{2}$ inch in diameter.

cinnabarinum, Wall. "Pl. As. Rar." p. 20, t. 21; (fig. "Gartenfl." 916).—Burma. Leaves ovate-lanceolate, acuminate; panicles terminal, large, loose; flowers numerous, crimson or pinkish; corolla tube $1\frac{1}{3}$ inch long, narrow-cylindric, limb 2-lipped, the three lobes of the lower lip wider than the upper lobes.

Very free in flowering, and lasting long in flower. Very beautiful when in full flower and well grown; it is of straggling growth, very difficult to get well-shaped plants, even with much pinching in; it is much in cultivation.

var. **ocellatum** (fig. "Bot. Mag." t. 5921) is a white-eyed variety.

var. **succisifolium**.—A plant with white flowers that I have not seen in cultivation.

coccineum, "Fl. des Serres" = ***Thyrsacanthus strictus***.

Cooperi, Hook. = ***Eranthemum sinuatum***.

crenulatum, Lindley (fig. "Bot. Reg." ii. t. 879).—Khasia, up to 2,000 feet elevation. Leaves lanceolate, acuminate; racemes slender, in a terminal panicle with curved, drooping branches; corolla pale purple, tube slender, narrowly funnel-shaped upwards. Only of botanical interest.

Dutremblayanum. "Jour. Soc. Nation. d'Hort. de France," 1906, 553.—A garden hybrid between *verbenaceum* and *longifolium*. See "Kew List of New Garden Plants of 1907." I have not seen this.

eboracense, Bull = ***Eranthemum tuberculatum***.

eldorado = ***Eranthemum reticulatum***.

elegans, Masters = ***Eranthemum acuminatissimum***.

flavum = ***Barleria flava***.

foecundum, Lindley (fig. "Bot. Reg." 18, t. 1494).—Lilac flowers on a terminal simple spike. Of botanical interest only.

graciliflorum, Nees in "Wall. Pl. As. Rar." iii. 107.—Penang. Leaves elliptic, lanceolate, punctate (under the lens), decussately arranged in pairs, short-petioled; spikes terminal, about 4 inches long; flowers decussate; bracts and calyx very small; corolla lavender-coloured with a paler blotch on lower lip, under the lens with numerous punctiform red dots; tube very narrow, $1\frac{1}{2}$ inch long, cylindric in its entire length. Syn. *E. punctatum*, DC. "Prod." xi. 455; *E. malaccense*, Clarke, "Fl. Brit. Ind." iv. p. 498. A very free-flowering species with very pretty flowers; it is inclined to straggling growth, which can be counteracted by well pinching in the rooted cuttings. Old plants should be thrown away after flowering.

hypocrateriforme, R. Br., Roem. & Sch. "Sys." ser. 1, 175; (fig. "Bot. Mag." t. 6181).—Tropical Africa, West Coast. Shrubby, straggling. Spikes solitary at the end of the branches or crowded on short terminal branches, about 3 inches long, forming a large terminal head; flowers crimson, bracts very small; calyx 6 lines long; corolla tube $1\frac{1}{2}$ inch long, very slender, cylindric, curved, lobes 1 inch in diameter, crimson on face, straw-coloured on back. A very fine species; in cultivation at Kew and in a few other stoves. It grows to a considerable size.

indicum, Clarke, "Fl. Brit. Ind." iv. 497; (fig. "Bot. Mag." t. 5062).—Himalayas, 1,000–5,000 feet elevation. Leaves lanceolate, elliptic, short-petioled; racemes up to 5 inches long, dense; flowers white, purple-veined, tube ventricose, curved, $1\frac{1}{2}$ inch long. Syn. *Thyrsacanthus indicus*, Nees. As pointed out by Mr. Clarke, the ventricose corolla tube is more that of *Thyrsacanthus* than of this genus, but the former is an American genus.

igneum, "Fl. des Serres" = ***Chamaeranthemum igneum***.

laxiflorum, A. Gray, "Proc. Amer. Acad." v. 5 (1862), 349; (fig. "Bot. Mag." t. 6386).—Fiji. Cymes few-flowered, axillary; corolla purplish, hypocrateriform, tube cylindric, about 1 inch long. Not a desirable plant, as I find it difficult to flower well;

it is of straggling growth, and with ordinary cultivation it only gives two or three flowers occasionally. If it could be got to behave like the plate in the "Bot. Mag." it would be well worth growing.

leuconeuron, Regel. (fig. "Gartenfl." t. 174).—Brazil. Leaves clouded with white markings; spikes axillary or terminal; flowers small, white. A rather pretty little foliage plant.

longifolium (fig. "Gartenfl." t. 536).—Leaves lanceolate, ending in a long, gradual acumination, rounded at the base, about 6 inches long by nearly 2 inches broad, blotched with white and darker shades of green; spikes terminal, generally twin, 6-8 inches long; flowers small. Pretty foliage, but a plant of hardly more than botanical interest.

maculatum, Hort., "Kew List of Tender Dicotyledons."—I have not been able to trace this species; it is not now in cultivation at Kew. The name is unpublished. It is probably one of the foliage species described here.

magneanum. "Jour. Soc. Nat. d'Hort. de France," 1906, 553.—A garden hybrid between *verbenaceum* and *longifolium*. See "Kew List of New Garden Plants of the Year 1907," p. 87. I have not seen this.

marmoratum, Regel. (fig. "Gartenfl." t. 536, fig. 2).—New Hebrides. Leaves white-mottled; spikes terminal; flowers very small. Only of botanical interest. See also "Gard. Chron." 1875, vol. iii. 619. It was sent out by Mr. Bull in 1874.

Moorei, Bull, "Gard. Chron." ser. 2, vol. iii. (1875), 619. —Polynesia. Leaves with mottled-green centre and a broad yellowish margin. Sent out by Mr. Bull in 1875. I know nothing of this plant, and it does not appear to be now in cultivation. It is mentioned in Nicholson's Dictionary as very curious and distinct. It may be a form of *atropurpureum*. I find these foliage *Kranthemums* and *Graptophyllums* vary very considerably in the colouring of their foliage according to the amount of heat and nature of the soil in which they are grown.

nigrescens, "Nicholson's Dict." = **atropurpureum**.

nigrum, "Ill. Hort." new ser. t. 404 = **atropurpureum**.

Parishii, Anders., "Jour. Linn. Soc." ix. 526, as *Asystasia*; (fig. "Bot. Mag." t. 5440).—Tenasserim. Leaves elliptic, glabrous; spikes terminal, subpanicled; flowers often fascicled; corolla purplish, tube $1\frac{1}{2}$ inch long, slender but funnel-shaped upwards, limb $\frac{3}{4}$ inch in diameter. Syn. *E. crenulatum* var. *grandiflorum*, Hooker.

reticulatum, Bull, "Gard. Chron." ser. 2, vol. iii. (1875), p. 619; (fig. "Bot. Mag." t. 7480); "Ill. Hort." new ser. xxvi. (1879), 349.—New Hebrides. Leaves beautifully reticulated, green and yellow; panicles in upper axils and terminal; corolla salver-shaped, white, speckled red in the centre, tube twice length of calyx. Syn. *aureo-reticulatum*, Hort., *E. Schomburgkii*, Hort. Much grown for its beautiful foliage. It does not flower often.

roseum, Lindau (fig. "Ill. Hort." 1876, t. 235).—Amazon Valleys. Leaves ovate, cordate, acute, purplish underneath; spike terminal,

slender; flowers in opposite pairs; bracts and calyx small; corolla rose-coloured, tube incurved, about 1 inch long, slightly enlarging upwards.

sanguinolentum, Hort. ex Veitch, "Fl. des Serres," ser. 2, v. 1865, t. 1583=*Hypoestes sanguinolenta*.

seticalyx, Clarke, "Fl. Trop. Africa," v.—Tropical Africa. Leaves 3-4 inches by 2 inches; panicles 2-8 inches long; corolla tube 1 inch long, pubescent, orange-yellow. A very pretty pot plant of late introduction; it flowers freely in a quite young state.

sinuatum, R. Br., Roem. & Sch. i. 175; (fig. "Bot. Mag." t. 5467); "Fl. des Serres," t. 2472.—Tanna Island, New Caledonia, and Solomon Islands. Leaves linear, margins scalloped, pinkish-purple underneath; flowers large, showy, white, purple-spotted. Syn. *F. Cooperi*, Hook., *F. longifolium*, Seem. "Fl. Vit." 185. A most charming stove species, generally grown under the name of *F. Cooperi*. Very small rooted cuttings begin to flower almost immediately. Cuttings should be constantly put in, as old plants soon get shabby and unsightly, whereas the cuttings, with a very little pinching in, make pretty compact plants.

tricolor, Nichols., "Dict." vol. i. p. 518.—Polynesia. Leaves green, blotched irregularly with purple and pink. Sent out by Mr. Bull in 1876. Grown constantly from cuttings, it is a very effective stove foliage plant for small pots; it soon becomes lanky and unsightly if grown on for long. I have never seen it in flower.

tuberculatum, Hook. f., Seem. "Fl. Vit." 185; (fig. "Bot. Mag." t. 5105); "Floral Mag." iii. 182.—Isle of Pines. A well-branched, compact little plant. Stems tuberculate; flowers numerous, pure white, about $1\frac{1}{2}$ inch across. Syn. *F. choruscense*, Bull, "Cat." (1881), p. 18; "Gard. Chron." 1890, vol. vii. 480. A most charming free-flowering species, which should be grown in every stove. Little cuttings make nice plants in about a month. Sent out by Mr. W. Bull in 1881. Scale insects attack it most voraciously, and are often overlooked by the gardener, as they are hardly distinguishable from the little warts which cover the stems.

variabile, R. Br., "Prod." 477; (fig. Paxt. "Mag. Bot." xiii. 75).—Australia. Leaves ovate-lanceolate, entire or slightly toothed, veins white-banded; panicles terminal, loose, peduncles few-flowered; calyx lobes small, subulate; corolla light purple with crimson markings in the throat. A pretty, rather dwarf species.

variegatum, Hort.—Hab. not known. Stems terete or subterete; leaves broad elliptic, or ovate-oblong, entire, the margins undulate and more or less irregularly scalloped, quite glabrous on both sides; texture thick, decurrent into a short petiole, about 6 inches long by $2\frac{1}{2}$ broad (exceptionally up to 8 inches by 5), more or less irregularly marbled with white or different shades of green; spikes terminal, racemose, about 6 inches long, the lower branches cyme-like, 3-5-flowered, upwards spiciform, pedicels as long as or longer than the calyx; the lowest pair of bracts foliaceous, lanceolate, curved, $\frac{1}{2}$ inch long, upper ones subulate, finely ciliate; flowers short-tubed, white, carmine spotted in the centre, about 1 inch long by $\frac{3}{4}$ inch in diameter; calyx-segments subulate, slightly

unequal, ciliate; corolla-tube about $\frac{1}{2}$ inch long, slightly enlarging towards the apex, lobes 5, oblong, obtuse, finely ciliate, the two lobes of the upper lip smaller than the others, the middle one of the lower lip much the largest; anthers exserted; stigma inconspicuously 2-lobed.

This is *variegatum*, Hort. of the Kew List of 1899, p. 271. It is also to be met with in gardens under this name. I cannot, however, find any authority for the name, and the plant appears to be undescribed. In the Herbarium of the Natural History Museum there is a specimen of *Eranthemum Carruthersii*, Seem. "Fl. Vit." (a Fiji plant), which may perhaps be the same as this species, as it agrees in the inflorescence and short corolla-tube; but the specimen is not sufficient for identification, being very poor as to leaves; the ciliation also of the calyx, bracts, and corolla-lobes is absent. Seeman's description is very short and insufficient.

Generally grown from cuttings as a small pot plant for its pretty foliage, being topped and grown on again when it gets leggy; it never flowers under these conditions. A plant has lately flowered at Kew, so I have been able to give a full description.

velutinum, Bull, "Cat. New Plants," 1887-8, p. 32.—Brazil. Leaves showy, dark olive-green; spikes 8 inches long, terminal; flowers rosy-pink, small, numerous; corolla tube curved, slender, 1 inch long. Sent out by Mr. W. Bull in 1886. Hardly more than of botanical interest. It is not *E. velutinum* of Engler's "Bot. Jahrb.," which is from New Guinea; so one of these names must be changed.

verbenaceum, Mart. in "Nov. Act. Not. Cur." xi. 1 (1823), 65.—Brazil. Leaves oblong, attenuated at base, glabrous, silvery lined on both sides; spike terminal, simple or trifid; flowers white; corolla twice as long as calyx.

versicolor, Bull ex "Gard. Chron." (1875), i. p. 619.—Hab? Leaves long-stalked, ovate, narrowed at the base, sinuate, ground colour dark green splashed over with greyish-green and yellowish-green in broad patches. Sent out by Mr. Bull in 1875. I do not know this plant.

Whartonianum, Hemsley, in "Kew Bull.," 1894, p. 214.—Solomon Islands. Leaves thin, almost membranaceous, ovate, oblong, or the upper ones narrow-lanceolate, up to 5 inches long, very minutely strigose above, puberulous on the veins beneath; petiole slender, $\frac{1}{2}$ inch; flowers white, $1\frac{1}{2}$ inch long, on terminal, racemose spikes, the lower branches of which are cymose and several-flowered; calyx-segments subulate, short; corolla-tube straight, slightly ventricose, lobes ovate-oblong, slightly unequal.

Eranthemum pulcherrimum, Anderson, from Oaxaca, Mexico, a very fine species, with very long tubular flower, and **E. Bourgoei**, Hemsley, Mexico, near Guadalajara, with very large, much swollen flowers like those of *Fagraea*, would well repay introduction to our houses.

Fittonia.—Lovely stove foliage plants for small pots in shady places, or to plant under stages. They are also very attractive on walls covered with peat and wired over, in association with other small foliage plants, *Achimenes*, &c.

argyroneura, E. Coem (fig. "Fl. des Serres," t. 1664).—Peru. Leaves a bright green, beautifully reticulated with white.

gigantea, Linden in "Rev. Hort." 1869, p. 186; (fig. "Gartenfl." t. 629).—Peru. Leaves green, with pale red veins.

Verschaffeltii, E. Coem (fig. "Fl. des Serres," t. 1581).—Peru. Leaves dark green, reticulated rich dark crimson.

The flowers of these *Fittonias* are inconspicuous, so the flower-spikes should be cut off as they appear.

Geissomeria

aurantiaca, Hort. This is a name given in the "Kew List of Tender Dicotyledons" (1899). I cannot trace the name anywhere, and the plant is not now in cultivation at Kew.

coccinea, Griseb., "Fl. Brit. West Indies," 454; (fig. "Bot. Mag." t. 1158).—West Indies. Glabrous. Leaves oblong, bluntish, tapering into a short petiole; spikes when axillary solitary, when terminal ternate, about as long as the leaves; flowers tubular, opposite, distant, diverging, rich crimson, whitish in the mouth; calyx 5-fid, one-sixth as long as the corolla; corolla-tube $1\frac{1}{4}$ inch long, slightly widening upwards, the lobes small, rounded, equal.

longiflora, Lindley (fig. "Bot. Reg." t. 1045).—Brazil. Leaves opposite, ovate-lanceolate, wavy, sessile, tapering at the base, glabrous above; spikes terminal and axillary, leafy at the base, closely imbricated; bracts 3, ovate, outer one twice as long as the two lateral; corolla dull scarlet, velvety, tube slightly enlarging upwards, lobes 4, erect, small, the upper rounded emarginate, the lateral smaller than the lower, which is bearded. A very pretty plant.

nitida, Nees, "Mart. Fl. Bras." ix. 80.—Brazil. Shrubby, glabrous. Leaves oblong, acute, shining; spikes terminal, simple or racemose at the base; bracts triangular, entire, half length of calyx; corolla glabrous, sub-bilabiate, $1\frac{1}{2}$ inch, incurved, purplish-red.

Graptophyllum.—Picture-leaved plants, grown for their foliage.

caudifolium, C. B. Clarke, MS. in Kew Herb.—Polynesia and New Guinea. Glabrous. Leaves narrow-lanceolate, up to 8 inches long by 2 inches broad, quite glabrous on both sides, margin entire or very obscurely crenated, decurrent into a short petiole, apex running into a very long gradual acumination, often all green with only a white band round the margin, sometimes variously blotched over with pink or darker green or white markings; terminal or side-shoots occasionally (but rarely) have leaves without the long acumination at the apex; flowers like those of *G. hortense*, but petals very narrow and reflexed. The only flowers I have seen were solitary in the axils of the leaves, but in Mr. Clarke's specimens, which I believe to be the same species, there are short racemes of flowers.

This is generally grown on constantly from cuttings as a small

pot foliage plant, in which state it is very pretty, but it never flowers treated like this. In time it gets leggy and unsightly. It has been grown at Kew as *Eranthemum* sp. ?, and I believe it is the *Eranthemum albo-marginatum* of Nicholson's "Dict. of Gardening."

Earlii, Mueller, "Frag. Phyt. Aust." iii. 160 and vi. 87.—Queensland. Shrubby, glabrous. Leaves oblong to ovate lanceolate, attenuated into a short petiole, acute or obtuse, entire or inconspicuously toothed; flowers red, axillary, solitary or few-clustered; corolla tube about 1 inch long, curved, 2-lipped, upper lip shortly bifid, lower 3-lobed; lobes lanceolate. A small-leaved species, the leaves being only about 1 inch long.

hortense, Nees in "Wall. Pl. As. Bar." iii. 102; (fig. "Bot. Mag." t. 1870); "Bot. Reg." t. 1227.—Uncertain where wild; cultivated throughout India. Leaves elliptic, curiously marbled with white, often representing faces, hence called the "caricature plant"; racemes axillary or terminal; flowers inflated in the throat, crimson.

var. **lurido-sanguineum** (fig. "Bot. Mag." t. 1780).—Leaves of a lurid-reddish colour.

var. **igneum**.—Leaves splashed with red markings.

var. **Nortonii**.—Of Continental origin. Leaves dark green. The caricature markings lurid-red or pink, or partly yellow.

Gymnostachyum.—A genus of scarcely more than botanical interest.

ceylanicum, DC., "Prod." xi. 93; (fig. "Bot. Mag." t. 4706); Bedd. "Ic. Pl. Ind. Or." t. 265.—Ceylon, in the plains. A low-growing herb. Leaves oval to obovate, obscurely serrate, tapering into a long petiole, midrib and main veins white-banded; racemes terminal, scapiform, up to 1 foot long; flowers fascicled on very short, glandular-pubescent pedicels; the 5 calyx-segments red; corolla white, tipped with green and yellow, tube elongate, $\frac{3}{4}$ inch, glandular-pubescent, nearly cylindric, but suddenly below the middle dilated upwards; limb unequally 2-lipped, lower lip much the larger, 3-lobed.

decurrens, Stapf, "Kew Bull." (1894), 357.—Pahang, Malay Peninsula. Leaves ovate, obscurely crenate, abruptly contracted into the petiole, often with a whitish band along the purplish midrib, up to 4 inches long by 2 inches broad; panicles terminal, composed of slender many-flowered spikes; corolla glandular-pilose, white, violet-lined; tube $\frac{3}{4}$ inch, twice as long as calyx, expanding slightly upwards; upper lip emarginate, lower 3-lobed.

venustum, DC., "Prod." xi. 94; (fig. "Bot. Reg." t. 1380).—Khasia hills, up to 4,000 feet elevation. Leaves ovate, acuminate, crenate, decurrent into a winged petiole, the radical ones about 6 inches by 4 inches; panicles pubescent, ample, much spreading, up to 8 inches long by 12 inches broad, or sometimes reduced to a single spike, pubescent; calyx glandular-pilose, 5-fid; corolla tube about 1 inch long, dilated towards the apex; limb bilabiate, deep purple, upper lip 2-fid, lower 3-fid. Syn. *Justicia venusta*; *Cryptophragmium venustum*.

Hemigraphis.—The plants of this genus are only of botanical interest—*repanda* and *stenophylla* are sometimes grown as hanging basket plants.

angustifolia, Hallier, f. (fig. "Nov. Act. Nat. Cur." lxx. 203, t. x. fig. 2).—Malaya, Amboyna, &c. Herb, erect; leaves 5 inches long by 1 inch broad, lanceolate, irregularly and deeply serrated or shortly pinnatifid, attenuate at base; apex acuminate; spikes terminal; heads strobiliform; bracts imbricate, ovate, obtuse, entire.

colorata, Nees, DC. "Prod." xi. 145; (fig. Hallier, f., "Nov. Act. Nat. Cur." lxx., t. ix. fig. 1).—Java. A small spreading plant. Leaves cordate-ovate, bullate, crenate, silvery-grey above, purple underneath; spikes terminal; flowers small, white, $\frac{1}{2}$ inch long.

The flowers are insignificant, but the species is sometimes grown for its pretty foliage.

latebrosa, Nees, DC. "Prod." xi. 723; (fig. "Bot. Mag." t. 3389, as *Ruellia elegans*).—India. A diffuse hairy plant. Leaves ovate, crenate; flowers bright blue; corolla-tube narrow, funnel-shaped, $\frac{3}{4}$ inch long. An annual, sometimes grown for its blue flowers, but mainly of botanical interest.

repanda, L., "Sp." ed. 2 (1762), p. 886.—Prostrate herb. Leaves decussate, long-petioled, narrow-linear, lobate, crenate; spikes solitary or ternate, axillary or terminal; heads of flowers strobiliform; bracts subspathulate-linear, subentire; corolla narrow-infundibuliform, hairy within the lips.

stenophylla, Hallier, f. (fig. "Nov. Act. Nat. Cur." lxx. 203, t. x. fig. 3).—Celebes, &c. Leaves linear, 8–10 inches long, $\frac{1}{2}$ inch broad, repand, scalloped; spikes elongate; bracts loose; corolla narrow-infundibuliform.

Hygrophila

spinosa, Anders., "Jour. Linn. Soc." vii. 22; (fig. Wight "Icones," t. 449).—India. A stout, erect, hispid, spinescent herb; leaves lanceolate, up to 7 inches long, furnished with long white hairs; flowers in axillary, spinous whorls, spines about 6, straight and stout; bracts up to 1 inch long, lanceolate; bracteoles $\frac{1}{2}$ inch long, narrow; calyx 4-parted; corolla 1 inch long, blue-purple, nearly glabrous, tube ventricose at the apex, limb deeply 2-lipped, oblong, straight. Syn. *Barberia longifolia* Linn. A very common ditch plant in India. Scarcely of more than botanical interest.

Hypoestes

aristata, R. Br., "Prod." 474; (fig. "Bot. Mag." t. 6234).—South Africa. Herb, erect; stem obtusely quadrangular; leaves petioled, ovate, acute, entire, 3 inches long; flowers in axillary clusters forming stout, terminal spikes, enclosed 1–3 in an involucre of two lanceolate, concave, long-awned bracts; corolla 1 inch long, rose-purple, tube slender, pubescent, expanding into a sub- campanulate throat, the lobes shorter than the tube, upper one obovate, cleft to the middle into 3 acute lobes, the lateral ones striped, the middle one spotted with purple, lower lobe much smaller, linear-lanceolate, erect, revolute, striped with white. A very pretty greenhouse plant.

purpurea, Wall., "Pl. As. Rar." iii. 114.—Malay Archipelago. Much cultivated in India. Leaves oval, acuminate at both ends, entire, pubescent beneath; thyrses axillary and terminal, spiciform, narrow; the floral leaves ovate, petioled, mucronate, $\frac{1}{4}$ inch long; corolla purple $\frac{3}{4}$ inch long, narrow, pubescent, upper lip oblong, emarginate, lower lip 3-parted, lobes linear. Syn. *Justicia purpurea*. Of botanical interest only.

involutocrata = *Peristrophe speciosa*.

sanguinolenta, Hooker (fig. "Bot. Mag." t. 5511).—Madagascar. Leaves dark green with fiery-red veins; flowers small, pink, insignificant. A lovely stove foliage plant for small pots. It should not be allowed to flower, and should be constantly propagated from cuttings which root most readily. Scale insects are particularly fond of it; to keep it clear it must be constantly looked over. Syn. *Eranthemum sanguinolentum*, Herb. ex Veitch, "Fl. des Serres," ii. v. (1865), t. 1583.

Jacobinia

aurea, Hooker (fig. "Bot. Mag." t. 4444).—Honduras. Leaves cordate, acuminate, decurrent into a longish petiole; thyrses large, terminal, compact; bracts longer than the calyx, and with the sepals linear; corolla yellow, tubular, cut down half-way into two gaping lips, upper one erect, entire, lower reflexed, 3-lobed at the apex. Syn. *Cyrtanthera catalpaefolia*.

chrysostephana, Benth. & Hook., "Gen. Pl." p. 1115; (fig. "Bot. Mag." t. 5887).—Mexico. Leaves ovate, acuminate, not decurrent on the petiole; midrib and veins below red; flowers yellow, in a terminal corymb; corolla 2-lipped; calyx $\frac{1}{4}$ inch; bracts shorter than the calyx. Syn. *Cyrtanthera chrysostephana*.

A most useful and beautiful winter flowering stove plant. It flowers freely without any special treatment. The flower-heads are smaller than in *aurea*.

coccinea, Hiern. in "Kjoeb. Vid. Mid." (1877), 84; (fig. "Bot. Mag." t. 432).—Brazil. Leaves elliptic, lanceolate; spikes terminal; flowers scarlet, crowded; helmet lanceolate, reflexed at the end.

A very beautiful winter-flowering species; flowering freely without any special treatment. It must not be kept too hot after it has made good growth, and should have plenty of air, otherwise it is inclined to grow lanky and too tall. This and *J. chrysostephana* succeed best from cuttings put in during the spring, the old plants being thrown away.

Giesbreghtiana, Benth. & Hook., "Gen. Pl." ii. p. 1115; (fig. "Gartend." t. 976); Paxton, "Mag." xv. 176; "Fl. des Serres," t. 889.—Leaves glabrous, ovate-lanceolate, entire; panicles terminal; flowers scarlet.

A fine winter-flowering stove plant, requiring a good rest in August or September and open-air treatment, otherwise it flowers very indifferently.

Lindenii, Nichols., "Dict. Gard." ii. 206; (fig. "Rev. Hort." (1870), p. 250 as *Justicia*).—Mexico. Leaves oval, acuminate, glabrous;

flowers orange-yellow in showy terminal heads. Very similar to *chrysostephana*.

magnifica, Lindau in "Eng. & Prantl, Nat. Pflanz." iv. 86 (1895), 351. Rio Janeiro. Leaves opposite, long-petioled, ovate, attenuate at base; spikes terminal, imbricated, many-flowered; bracts, outer ovate-lanceolate, inner small, linear; corolla-tube long, 2-lipped, upper lip erect, entire, lower revolute, 3-lobed, red or rose-coloured. See "Garden and Forest" (1892), 317.

var. **carnea** (fig. "Bot. Mag." t. 3383); "Bot. Reg." t. 1397.—Leaves nearly glabrous, purple underneath; flowers rose-coloured. Syn. var. *nana*, var. *minor*, *Cyrtanthera magnifica*.

var. **Pohlana**.—Leaves ovate, acuminate, almost cordate at the base, glabrous; flowers bright crimson. Only differs from *carnea* in the colour of the flowers. *Velutina*, the downy-leaved variety, is often grown under this name.

var. **velutina**.—Leaves and bracts softly villous; flowers pink. **Mohintlii**, Hemsl., "Biol. Cent. Amer. Bot." ii. 521.—Mexico. Leaves opposite, elongate-ovate, entire or obscurely crenulate, soft and slightly puberulous; racemes axillary, shorter than the leaves, few flowered; flowers bright orange, narrow, tubular, 1½ inch; tube swollen just at the base, then cylindric-ventricose upwards and bilabiate; upper lip arched, entire, lower one deflexed, spirally curved, with a 3-toothed apex. Syn. *Scricographis Mohintlii*, Nees; *S. Drejera*, Nees.

A very pretty winter or early spring flowering plant. It requires the same treatment as *Ghiesbreghtiana*, otherwise its flowering is a failure.

pauciflora, Benth. & Hook., "Gen. Pl." ii. 1115; (fig. "Bel. Hort." 1863, p. 2).—Brazil. Leaves elliptic-oblong; flowers numerous, drooping, tubular, scarlet, yellow-tipped; tube funnel-shaped; limb erect, bilabiate. Syn. *Libonia floribunda*, under which name it is generally grown.

A showy plant when well flowered, requiring similar treatment to *Ghiesbreghtiana*; not easy to flower well.

penrhosiensis. Hybrid between *pauciflora* and *Ghiesbreghtiana*; (fig. "Rev. Hort." (1876), 50).—Flowers of a brighter crimson than *pauciflora*; leaves more acute.

A fine winter-flowering plant.

sericea, Ruiz. et Pav. (fig. "Fl. Peru," t. 9, fig. b).—Peru. Whitish-silky; leaves costate, oblong-acuminate, floral ones ovate; spikes terminal; flowers red; corolla 2 inches long, pubescent.

suberecta, André (fig. "Rev. Hort." (1900), 210).—Uruguay. Leaves opposite, subsessile, very velvety, downy; calyx woolly, sepals oval; corolla tubular, about 1 inch long; tube narrow, 2-lobed, just at apex.

A low-growing, much spreading species. A good basket plant, but not very ready to flower.

Justicia.—The species of this genus are of botanical rather than of horticultural interest.

calycotricha, Link. = **Schaueria calycotricha**.

Campylostemon, Anders., "Journ. Linn. Soc." vii. (1864) 44.—

Natal. Leaves ovate, acuminate, nearly glabrous; peduncles axillary, shorter than the leaves, few-flowered; flowers small, white, the lower lip purple-spotted. Only of botanical interest.

furcata, Jacq. (fig. "Sch." i. 2, t. 8).—Mexico. Leaves villous, ovate-lanceolate; flowers axillary, solitary, 1 inch long, violet, ringent; upper lobe arched, slightly bifid at apex; lower lip ample, 3-lobed, the centro lobe reticulated with white. This is occasionally met with in stoves, but it is hardly worth growing. *J. peruviana*, "Bot. Mag." t. 480, is very similar, but with the flowers clustered in the axils; it is, perhaps, only a form of this species.

Gendarussa, L., "Suppl." 35; (fig. "Bot. Reg." t. 635).—India and Burma, and much cultivated there. Shrubby, leaves lanceolate, glabrous; spikes up to 5 inches, terminal, often paniculate, the lower clusters of flowers distant; bracts linear, small; flowers $\frac{1}{2}$ inch, nearly glabrous, white with purple spots.

geniculata = **Dianthera secunda**.

marmorata, Nichols. "Dict." = **Eranthemum marmoratum**.

pedunculosa = **Dianthera americana**.

peruviana, "Cuv. Ic." p. 17, t. 28; (fig. "Bot. Mag." t. 430).—Peru. Stems pubescent; leaves petioled, ovate-lanceolate, hairy above; flowers violet, the lower lip reticulated with white veins, clustered in the axils.

quadrifaria, Nees, "Wall., Pl. As. Rar." iii. 105.—Assam. Leaves elliptic; flowers in dense, axillary clusters; bracts $\frac{1}{3}$ inch, spatulate, rusty; corolla hairy, $\frac{2}{3}$ inch, white, rose-spotted.

ventricosa, Wall., "Pl. As. Rar." i. 80, t. 93; (fig. "Bot. Mag." t. 2766).—Burma. Leaves elliptic, glabrous; spikes terminal, 3 inches long; bracts green, orbicular, about $\frac{1}{2}$ inch long, imbricate, usually 3-flowered; flowers $\frac{2}{3}$ inch, white, rose-spotted.

Lankesteria.—Tall plants allied to *Daedalacanthus*, with dense terminal spikes of red or yellow flowers.

Barteri, Hooker (fig. "Bot. Mag." t. 5533).—West Africa. Leaves ovate-oblong, acuminate, narrowed at base, up to 8 inches long; spikes terminal; bracts imbricate, ovate, acuminate, nervose, puberulous and ciliate; calyx segments $\frac{1}{3}$ – $\frac{1}{2}$ inch, linear, long-ciliate, half the length of corolla tube; corolla tube hairy.

elegans, DC., "Prod." xi. 447 as *Eranthemum*.—Tropical West Africa. Leaves elliptic, acuminate at both ends; short-petioled, up to 9 inches by $2\frac{1}{2}$; spikes terminal, strobiliform, about 6 inches long by 1 inch broad; bracts laxly overlapping, 1 inch long by $\frac{1}{2}$ inch broad, acute, shining, glabrous; sepals $\frac{1}{2}$ inch, softly hairy; corolla orange-yellow, tube $1\frac{1}{2}$ inch; lobes $\frac{1}{2}$ inch, obovate. Common in cultivation.

parviflora, Lindley (fig. "Bot. Reg." t. 1846 as *Eranthemum*).—Sierra Leone. Leaves obovate to lanceolate, tapering at both ends, $4\frac{1}{2}$ by $1\frac{1}{2}$ inches; petioles very short; spikes axillary; flower-heads short, ovoid, imbricate, 1 inch in diameter; bracts $\frac{3}{4}$ inch; sepals 1 inch, ciliate; corolla yellow; tube slender, $1\frac{1}{4}$ inch

long; lobes obovate, $\frac{1}{3}$ inch, bent all to one side. Syn. *L. longiflora*, *L. hispida*.

Lepidagathis.—A genus of botanical interest only.

cristata, Willd., "Sp. Pl." iii. 400.—India. A small procumbent plant. Leaves linear or oblong, sessile, 1 inch by $\frac{1}{4}$ inch; inflorescence subradical, globose; bracts elliptic or obovate, spinulose; corolla small, $\frac{1}{3}$ inch, white with purple spots on the palate. Only of botanical interest.

Pobeguinii, Bull, "Mus. d'Hist. Naturelle Paris," 1895, 64.—Upper Guinea. A curious plant, with Lycopodium-like stems 8 inches high, growing in tufts; flowers dark purple, at the base of the stems. A botanical curiosity.

Libonia floribunda=**Jacobinia pauciflora**.

Otacanthus.—A genus very closely allied to Ruellia.

coeruleus (fig. "Fl. des Serres," t. 1526).—Brazil. Leaves elliptic, serrate, 3-4 inches long by about 2 inches broad; flowers solitary from the upper axils; calyx 5-sepalled, 4 setaceous, the dorsal one foliaceous; corolla hypocrateriform, tube elongate, cylindric, arcuate, limb flat, bilabiate, the lobes rotundate, subequal, large, spreading.

Paulowillhelmia

togoensis, Lindau, "Eng. Jahrb." xvii. 105; (fig. "Gard. Chron." 1889, vi. p. 749, fig. 106).—Abyssinia. Stems viscid upwards; leaves truncate and subcordate at the base; panicles terminal, cymose; the cymes lax, 2 inches long; calyx nearly 1 inch long; corolla deep bright blue, tube up to 3 inches long, linear, inflated upwards, lobes 5. Syn. *P. speciosa*, N. E. Brown, "Gard. Chron." 1889, vi. p. 740, fig. 105, not Hochst.

A rare and interesting plant, prized for its beautiful blue flowers.

Peristrophe

lanceolaria, Nees, "Wall. Pl. As. Rar." iii. 114; (fig. "Bot. Mag." t. 5566).—India and Burma at no elevation. Leaves lanceolate, nearly glabrous; panicles with erect branches, glandular pubescent; bracts $\frac{3}{4}$ inch, linear; corolla $1\frac{1}{4}$ inch, purple, tube long, slender. Syn. *Justicia lanceolaria*.

salicifolia, Hassk., "Cat. Hort. Bog." Alt. 152.—Java. Leaves narrow, elliptic, obscurely crenated, glabrous, streaked with yellow along midrib and veins; peduncles axillary, short cymose, few-flowered, with linear bracteoles much longer than the calyx; flowers small pink.

A tropical weed, sometimes grown for its prettily coloured leaves. The latter, however, often revert to their original green colour, and then it is not worth growing.

speciosa, Nees, "Wall. Pl. As. Rar." iii. 113; (fig. "Bot. Mag." t. 2722).—Himalayas, up to 5,000 feet elevation. Leaves elliptic, acute, nearly glabrous, oblong, obtuse, floral leaves large, 1-2 inches, so that the flower clusters often appear terminal or axillary, subcapitate rather than paniced; bracts linear-oblong, $\frac{3}{4}$ inch;

corolla $1\frac{3}{4}$ inch, purplish-pink, tube slender, limb deeply 2-lipped.
Syn. *Justicia speciosa*.

A much-grown winter-flowering stove plant. To flower well it should be rested at the end of the summer and be placed in the open air for three weeks or so.

Petalidium

barlerioides, Nees in "Wall. Pl. As. Rar." iii. 82; (fig. "Bot. Mag." t. 4053).—India, up to 8,000 feet elevation. Undershrub; leaves ovate, crenate, hoary or dusky, puberulous; peduncles axillary, solitary; bracteoles $\frac{3}{4}$ inch, reticulated, becoming scarious; corolla campanulate, pale blue or white, tube ventricose from nearly the base, 1 inch long.

Phaylopsiis

parviflora (fig. "Bot. Mag." t. 2438). A plant of botanical interest only.

Phlogacanthus.—Handsome shrubs.

asperulus, Nees in "Wall. Pl. As. Rar." iii. 99; (fig. "Bot. Mag." t. 2845 as *Justicia quadrangularis*).—Assam. Shrubby, erect. Leaves elliptic, glabrous, serrate upwards; panicles linear, subthyrsoid, terminal, 4 inches long, somewhat pubescent; bracts and calyx very small; flowers purple, yellow-marked; corolla $\frac{1}{2}$ inch, funnel-shaped, the tube being suddenly curved and inflated at the summit. Syn. *Justicia asperula*, Lodd. "Bot. Cab." t. 1681. See also "Bot. Reg." t. 1340.

curviflorus, Nees in "Wall. Pl. As. Rar." iii. 99; (fig. "Bot. Mag." t. 3788).—Khasia and Burma up to 4,000 feet elevation. Shrub. Leaves elliptic, nearly glabrous; thyrses villous, 8 inches long, short-peduncled; flowers villous, nearly 2 inches long, red, tube curved, scarcely widened upwards. Much cultivated in Indian gardens and about temples.

guttatus, Nees in "Wall. Pl. As. Rar." iii. 99; (fig. "Bot. Reg." t. 1834).—Khasia, up to 4,000 feet elevation. Leaves elliptic, glabrous; panicles 6 inches long, terminal, solitary or 2-3 together, slightly pubescent; flowers pubescent; corolla $\frac{3}{4}$ inch, 2-lipped; upper lip suberect, shortly 2-lobed, yellow; lower 3-lobed, green, purple-spotted.

Porphyrocoma

lanceolata, Scheidw. in "Journ. Hort. Prat." iii. p. 72; (fig. "Bot. Mag." t. 4176).—Brazil. Erect herb. Leaves sessile, elliptic; spikes cone-like, terminal; flowers purple, with large red imbricated bracts. Syn. *Dianthera Pohlana*.

A showy plant, rather common in cultivation.

Rhinacanthus.—A genus only of botanical interest.

communis, DC., "Prod." xi. 442; (fig. "Bot. Mag." t. 325).—India. Leaves oblong or ovate-oblong, up to 4 inches long by $1\frac{1}{2}$ inch broad; panicle terminal or axillary, large, spreading, dusky-pubescent, 3-cleft; flowers often clustered; bracts and bracteoles very small; calyx pubescent; corolla-tube 1 inch long, narrow, the three lower lobes of the limb each twice as broad as the

shortly bifid upper. Syn. *Justicia nasuta*. Very much cultivated in India as a medicinal plant.

Ruellia. A large genus with many interesting stove species. Some make very handsome pot plants, such as *formosa*, *Herbstii*, *macrantha*, *macrophylla*, which are often seen in our stoves; others are well worth growing in large establishments, whilst several are of not much more than botanical interest. Two species, *ciliosa* and *strepens*, are hardy, or nearly so—a very rare character in this order.

acutangula, Nees, in "Mart. Fl." xxi. (1888), 11; Deibl. 61; (fig. "Bot. Mag." t. 6882).—Rio, in shady forests. A large herb. Leaves 6-8 inches, elliptic, acuminate; flowers sessile, large, 2 inches long, scarlet, on a dichotomously branched peduncle with a flower in the fork; calyx cylindric, $\frac{1}{2}$ inch long; corolla-tube 1-1 $\frac{1}{2}$ inch long, slightly curved, 2 inches in diameter, sometimes yellow in the throat; lobes oblong. Common in cultivation.

var. **hirsuta**. Stems densely hirsute.

affinis = **speciosa**.

amoena, Nees, DC. "Prod." xi. 203.—South America. Leaves broadly elliptic, entire or very obscurely scalloped, glabrous on both sides, lower ones up to 7 inches by 3 inches; petioles 1 inch; peduncles axillary, 4 inches long and then bracteated and cymose; calyx $\frac{1}{2}$ inch, segments 5, filiform, one longer than the others; corolla tubular, crimson, yellow-streaked inside, 1 $\frac{1}{4}$ inch long, curved, the lower cylindric portion very short ($\frac{1}{2}$ inch), then suddenly ventricose and sack-like, but laterally compressed, limb of 5 very short erect lobes. Rather common in cultivation, flowers all the year round, and sows itself.

Baikiei, Wodr., "Gard. India," ed. v. 417; (fig. "Bot. Mag." t. 5111).—Niger, West Africa. Herbaceous, 2-3 feet. Leaves large, ovate-lanceolate, acuminate; panicles terminal, much-branched, forming a large head with copious bracts and bracteoles; flowers crimson; calyx small, segments 5, linear; corolla about 2 inches long; tube curved, trumpet-like, ventricose from above the middle.

Blumei, Steud., "Nom." ed. ii. p. 480.—Java. Leaves about 4 inches long, narrow-oblong, rounded at the apex, gradually attenuated at base, very scabrous, margins crenulate; spikes axillary, a little shorter than the leaves, few-flowered; flowers small, whitish, the lobes pink-tipped; corolla $\frac{3}{4}$ inch long, lower half of tube narrow, cylindric, then very suddenly funnel-shaped.

A rather pretty pot plant when well in flower, but scarcely of more than botanical interest. Introduced to our stoves from the Jardin des Plantes, Paris. It sows itself very readily.

ciliatiflora, Hook. (fig. "Bot. Mag." t. 8718).—Buenos Ayres. Stem herbaceous, scabrous; leaves ovate, petioled, serrate, hairy; panicles terminal, leafless, few-flowered; flowers lavender; calyx segments long, subulate, one much longer than the others; corolla-tube 1 inch, curved, enlarging upwards, lobes 1 inch across. A very fine species.

ciliosa, Pursh., "Fl. Amer. Sep." ii. 420.—North America. Hardy plant. Leaves oblong or oval, almost sessile; flowers blue, 2 inches long; corolla-tube twice as long as the calyx. Syn. *Dipteracanthus ciliatus*.

Devosiana, Hort. Makoy ex Morr (fig. "Belg. Rev. Hort." (1877), 19).—Brazil. Leaves narrow lanceolate, toothed, purple underneath, main veins and midrib above white-banded; flowers axillary, white, rose-tinted; corolla-tube at first narrow cylindric, then suddenly ventricose and bent at middle.

A pretty foliage plant.

Dipteracanthus, Hemsl., "Biol. Cent. Amer. Bot." ii. 584.—Vera Cruz, 2,000 feet elevation. Low-spreading herb. Leaves oblong-lanceolate, obtuse, running into a long petiole at the base, hirsute; flowers axillary, solitary, subsessile; bracteoles linear, obtuse; calyx segments linear, attenuated; corolla $1\frac{1}{2}$ inch long, purple; tube curved, the lower 1 inch narrow cylindric, then expanding upwards; lobes large, $1\frac{1}{4}$ inch across.

This species has fine showy flowers if well fed when coming into bud. It is very effective when several plants are grown in a pan together.

elegans = **Hemigraphis latebrosa**.

formosa, Andr., "Bot. Rep." t. 610; (fig. "Bot. Mag." t. 1400).—Brazil. Leaves petioled, ovate, acute, shortly hairy; peduncles axillary, three times length of leaves, somewhat branched at the apex, 2-3-flowered; flowers showy, scarlet; bracts linear-lanceolate; corolla-tube $1\frac{1}{2}$ inch long.

A very useful stove plant; flowers freely; sows itself in the stove.

fulgida, And., "Bot. Rep." t. 527.—Colombia. Leaves petioled, ovate, acute, pilose, crenate; peduncles axillary and terminal with heads of small red flowers which are narrow trumpet-shaped; calyx of five linear segments; corolla-tube $\frac{3}{4}$ inch, limb of five unequal lobes.

Not a showy species.

Herbstii, Hiern., "Kjoeb Vid. Med." 1877, 75; (fig. "Bot. Mag." t. 5156).—Brazil. An erect plant. Leaves lanceolate, acuminate, sinuate, serrated, purplish beneath; flowers three to five together in axillary, sessile fascicles, $3\frac{1}{2}$ inches long, pale rose; calyx reddish, $\frac{3}{4}$ inch long; corolla-tube in the lower 2 inches narrow cylindric, then abruptly bent and enlarging upwards; limb of 5 short equal lobes. Syn. *Dipteracanthus Herbstii*.

A pretty stove species, the flowers with their very long tubes are striking; very easily grown and flowers well.

latebrosa = **Hemigraphis latebrosa**.

lilacina = **Ruellia Schaueriana**.

longifolia, Rich. in "Act. Soc. Hist. Nat." Part 1 (1792), 110.—Brazil.—Glabrous. Leaves oblong lanceolate or oblong, attenuated at both ends, repand or denticulate; peduncles axillary, shorter than the leaves, bifid, many-flowered; flowers vermilion; lobes retuse.

This I have not seen. It is probably not now in cultivation. See Nicholson's "Dict.," vol. iii. p. 333.

Lorentziana, Gris. in "Goet. Abh." xxiv. (1879), 259; (fig. "Rev. Hort." 1902, 186).—Uruguay. Erect. Stem 4-sided; leaves entire, opposite, decussate, oval, subcordate or attenuate at base, acuminate at apex, 3-4 inches long, somewhat scabrous beneath; panicle terminal, loose, about 6 inches long; heads 3-flowered; flowers violet blue; calyx segments narrow, glandular; corolla infundibuliform, tube bent a little above the base and then expanding, lobes five, large, $1\frac{1}{2}$ inch across.

A very pretty species in cultivation at Kew, &c., nearly allied to *R. ciliatiflora*, but the leaves are not serrated.

macrantha, Nees, "Mart. Fl. Bras." ix. 37; ("Rev. Hort." 1881, t. 410), "Bot. Mag." t. 7892.—Brazil. Leaves long lanceolate; flowers axillary, very large, about $3\frac{1}{2}$ inches long, by $2\frac{1}{4}$ inches across the lobes, rose-coloured with veined throat, tube narrow at the base, gradually expanding upwards.

The finest of all the species. There is a very good figure of it in the "Garden" vol. xxxi. (1887), p. 604, which shows what a beautiful species it is. This was drawn in my garden by Miss Lowe, the daughter of the celebrated gardener Dr. Lowe. Cuttings taken between April and July flower better the next winter and early spring than the old plants (which may be thrown away). To flower these well, they require a rest in the late summer and a short period in the open air to ripen the wood. Without this treatment the flowering is often very unsatisfactory, whereas the other species flower without any special attention in this way.

macrophylla, Vahl, "Symb. Bot." ii. 72, t. 39; (fig. "Bot. Mag." t. 4448); "Bot. Reg." 32, t. 7. —Santa Marta, Colombia. Leaves opposite, petioled, ovate, acuminate, sinuate, or slightly toothed; panicles axillary, spreading, subsecund; corolla bright scarlet, tube about 3 inches long, curved, broader upwards, laterally compressed, limb large, lobes reflexed. Syn. *Stemonacanthus macrophyllus*.

A very fine species exceedingly like *R. amoena* in habit and in its laterally compressed flowers, but the corolla tube is very long, whilst in *amoena* it is short. This species is rare in cultivation (*amoena* very common); it flowers profusely without any special attention; it seeds well. (Attention might be given to hybridising some of these Ruellias.) Cuttings should constantly be put in, as old plants soon get unsightly.

Makoyana, Hort. Makoy ex Closon (fig. "Rev. Hort." (1815), 109).—Brazil. Leaves olive-green, shaded with violet above, purple beneath; flowers solitary, axillary and terminal, rosy-carmine, tube long, ventricose upwards from a contracted base.

A low-spreading very pretty species, best grown in a pan, foliage very attractive.

paniculata, L. "Sp. Pl." 635; (fig. "Bot. Reg." t. 585).—Jamaica. Leaves oblong, oval, pubescent; peduncles axillary, dichotomous; flowers bluish-purple; calyx segments 5, linear; corolla funnel-

shaped, $\frac{1}{2}$ inch long, tube curved and suddenly bent at the middle. Called 'Christmas Pride' in Jamaica, as it flowers at that season.

Pearcei, Hook. (fig. "Bot. Mag." t. 5648).—Bolivia. Erect, glabrous under shrub. Leaves short-petioled, lanceolate, acuminate, crenate, purple underneath; peduncles axillary, spreading, few-flowered; bracts linear; calyx $\frac{1}{2}$ inch; segments 5, linear; flowers scarlet, $2\frac{1}{2}$ inches long, erect, tube slender, slightly curved, very gradually dilated upwards, lobes rather small, recurved.

persicifolia (fig. "Bot. Reg." ii. t. 955) = **Strobilanthes anisophyllus**.

Portellae, Hook. (fig. "Bot. Mag." t. 6498).—Brazil. A small low-spreading plant. Leaves petioled, small, elliptic-ovate, purple beneath; flowers axillary, solitary, sessile, rose-coloured, $1\frac{1}{2}$ inch long; tube slender, dilated above the middle; limb flat, 1 inch in diameter; sepals $\frac{1}{2}$ inch long.

Common in cultivation. It is best grown in a pan.

pulchella = **rubicaulis**.

Purdieana, Hook. (fig. "Bot. Mag." t. 4298).—Jamaica. Leaves petioled, ovate, acuminate; flowers large, crimson, terminal in pairs, each with a very large pair of bracteoles; corolla-tube much elongated, limb of 5 waved lobes. See also Paxton's "Mag. of Bot." xvi. p. 129.

rosea, DC. "Prod." xi. 220, as *Ophthalmacanthus roseus*, Hemsl. "Biol. Cent. Amer. Bot." ii. 607.—South Mexico, 5,000 feet elevation. A very hirsute plant with angled stems; leaves ovate, obtuse, about 1 inch long, on a short petiole; peduncle 2-leaved towards the apex, 1-flowered; flower sessile; calyx 5-parted, glandular-tomentose; corolla 2 inches long, rose-coloured.

rubicaulis, Cav. "Ic." v. 417.—Mexico. This is mentioned in the Kew Hand List for 1899, p. 601. I have never seen it in cultivation. It is only of botanical interest. The plant now growing under this name at Kew is *Ruellia acutangula*, var. *hirsuta*.

Sabiniana, "Bot. Reg." xv. t. 1238 = **Strobilanthes Sabinianus**.

Schaueriana, DC., "Prod." xi. 119; (fig. "Bot. Mag." t. 4147, as *Ruellia lilacina*).—Brazil. Leaves opposite, ovate, shining; flowers axillary, sessile, lilac-coloured and veined; bracts two, large, leaf-like, on very short petioles, 1 inch long, $\frac{3}{4}$ inch broad; corolla-tube very long, funnel-shaped, curved, bent below the middle; limb of five rounded lobes. See also "Bot. Reg." xxxii. 45. Common in cultivation.

solitaria, Vell., "Fl. Flum." 266, vi. t. 95; (fig. "Bot. Mag." t. 5106, as *Dipteracanthus calvescens*); "Bot. Mag." t. 4366, as *Strobilanthes lactatus*.—Brazil. Leaves opposite, about 2 inches long, oblong or ovate-lanceolate, short-petioled, sometimes blotched with white down the middle; flowers solitary or twin, nearly sessile; bracts smaller and narrower than in *R. Schaueriana*; corolla lavender-blue, tube long, funnel-shaped, the lower half white; bracts lanceolate, acuminate, larger than the calyx; calyx 5-parted, subulate.

speciosa, Nees, in "Mart. Fl. Bras." ix. 30; (fig. "Bot. Mag." t. 5414, as *P. affinis*).—Brazil. Leaves oval, petioled; flowers axillary, solitary, very large, scarlet, infundibuliform; corolla-tube funnel-shaped, $3\frac{1}{2}$ inches. In the way of *macrantha*. Syn. *Dipteracanthus affinis*. A very fine species.

spectabilis, Nichols., "Dict. Gard." iii. 334; (fig. "Bot. Mag." t. 4494).—Peru. Leaves nearly sessile, ovate, acuminate, attenuate at the base, ciliate at margin and slightly hairy above; flowers very large, purplish-blue, marked with dark veins, twin in the axils; calyx deeply divided; corolla-tube funnel-shaped, curved, $3\frac{1}{2}$ inches long, lobes 5, large, rounded. Syn. *Dipterocarpus spectabilis*. A very fine, large-flowering species.

strepens, L., "Sp. Pl." 634.—North America. Leaves ovate to obovate-oblong, subrepand, decurrent on to the petiole; peduncles axillary, 1 3 or more flowered, bracteoles oval, oblong, equalling the calyx; calyx segments lanceolate-linear, acute, ciliate; corolla large, tube elongate, infundibuliform, a little longer than the calyx, limb purplish.

Well suited for a basket or large pan; a very pretty object when well pinned down, flowering as it does from every axil.

tuberosa, L., "Sp. Pl." 615.—Central America and West Indies. A tomentose herb. Root consisting of several fleshy tubers; flowers large, 1 2 on axillary or terminal, long peduncles; calyx segments long, filiform, as long as the lower cylindric portion of the corolla-tube; corolla nearly 2 inches long, tube cylindric below, funnel-shaped upwards.

The two following species might well be introduced :—

angustior, Nees.—Brazil. A very fine species with a terminal head of large crimson flowers.

subringens, Nees.—Rio. Very fine large crimson flowers, cultivated in the Grenada Botanical Garden.

Ruellia superba, Hort., of the Kew List of Tender Dicotyledons (1899) is not, as far as I have been able to find out, a published name. The plant is not now known at Kew.

Rungia

eriostachya, Bull., "Mus. d'Hist. Nat. Paris" (1905), 62.—Upper Guinea. Stem pubescent; leaves ovate-lanceolate, 3 inches long; spikes crowded; bracts and calyces with long white hairs; flowers white and yellow.

Like other plants of this genus only of botanical interest.

Ruttya

ovata, DC., "Prod." xi. 309; (fig. "Thes. Cap." vol. ii. p. 144).—South Africa. Leaves ovate, acuminate, tapering into the very short-winged petiole, up to 5 inches by 2 inches; spikes terminal, strobiliform, ovate-oblong, densely many-flowered, bracteolate; bracts subulate; calyx segments subulate, very long; corolla bright red, bilabiate, the upper lip erect, flat, slightly bifid, lower deflexed, 8-lobed. A pretty shrub.

Sanchezia

longiflora, Hook. (fig. "Bot. Mag." t. 5588); "Fl. des Serres," t. 2460.—Guayaquil. Leaves ample, oblong to lanceolate; panicles branched, elongate, drooping, purple-coloured; flowers 2 inches long, tubular, and with the calyx and pedicels of a rich purple colour. Syn. *Ancylogyne longiflora*.

nobilis, Hook. (fig. "Bot. Mag." t. 5594); "Flor. des Serres," t. 2487. —Ecuador. Shrub. Leaves up to 9 inches long, oblong to lanceolate; flowers in an erect, terminal, dense panicle with purple branches; bracts red, $1\frac{1}{2}$ inch long, each pair enclosing about 10 flowers; corolla yellow, 2 inches long, cylindric, curved.

var. **glaucophylla**.—Leaves glaucous-green, striped with yellow. This variety is very much grown, more for its beautifully coloured foliage than for its flowers.

parvibracteata, Sprague & Hutch. in "Kew Bull." for 1908.—Allied to *S. nobilis*, but petioles not winged, bracts smaller, flowers fewer, staminoles larger. Received at Kew from the Perideniya Gardens in Ceylon.

Schaueria

calycotricha, Nees, DC. "Prod." xi. 816; (fig. Hook. "Exotic Fl." t. 212).—Brazil. Leaves broadly ovate, glabrous, scarcely acuminate, long-petioled; thyrses terminal, subspicate; flowers yellow, about as long as the calyx segments; calyx and bracts yellowish-green, puberulous; corolla tube slender, $1\frac{1}{4}$ inch long, pubescent, upper lip entire. Syn. *Justicia calycotricha*.

flavicomma, Lindley, "Bot. Reg." t. 1027; (fig. "Bot. Mag." t. 2816, as *calycotricha*); Lodd. "Bot. Cab." t. 1921.—Leaves lanceolate, very acuminate, short-petioled, minutely downy, the midrib and main veins very pale-coloured or whitish; panicles terminal furnished with numerous, peculiar, hair-like processes; bracts and calyx shorter than corolla; calyx white with gland-tipped hairs; corolla smooth, 2-lipped, upper lip emarginate.

These two species have been very much confused. They are perhaps only varieties of one.

Stenandrium

igneum = *Chamaeranthemum igneum*.

Lindenii, N. E. Brown (fig. "Ill. Hort." (1891), t. 186).—Brazil and Peru. A dwarf foliage plant. Leaves opposite, elliptic-obovate, obtuse, dark green, shaded lighter towards the centre, the main veins yellow; spikes cylindric, erect; flowers yellow.

S. Beeckmannianum, "Ill. Hort." (1892), t. 166, and **Goossensianum**, "Ill. Hort." (1893), t. 168, are garden hybrids. The latter has leaves variegated with green and yellow and margined with brown.

Strobilanthes, Blume.—The name given in allusion to the inflorescence, which often resembles a strobile or fir-cone. A very large genus of nearly 200 species, most abundant in the damper and denser mountain forests of India, Burma, and Ceylon, from the plains up to high elevations. They are often gregarious, and one can walk through acres and acres of the same species forming

the entire undergrowth below large forest trees. There are about sixty species in Southern India and Ceylon alone; all or nearly all of these have been figured in Wight's "Icones" or in my "Icones." They are mostly rather large shrubs, many have very beautiful flowers, others very curious ones, all are interesting, and I think I may say it is the most exciting genus in the order to the botanist in India. Most of these forest species do not flower till they reach maturity, at seven or eight years of age; they then die down and leave acres of bare dead stems; the next rainy season they come up again thickly from seed. Dying immediately after flowering, and probably not seeding in this country, they would never become popular plants here, but it would be a most interesting genus for botanical gardens to take up and experiment on. They all grow most readily from cuttings, which would travel well in damp moss (now the communication with India is so rapid); they also grow readily from seed. Some few of the forest species flower annually and do not die after flowering. The species found on the open grasslands at the higher elevations also flower more or less every year and are perennial.

S. amabilis, Clarke, "Fl. Brit. India," vol. iv. p. 476; figured in Wight's "Icones," t. 1507, as *Leptacanthus Walkeri*—a species found about Sispara on the Nilgiri Mountains—flowers annually and does not die down after flowering; it is, I think, the most beautiful species in the order, being perfectly gorgeous when in flower. It has never been introduced into this country, and efforts should be made to procure it; it would cause quite a sensation at a flower show. **S. pulcherrimus** (Anderson, "Fl. Brit. Ind." iv. p. 475), a closely allied plant found at the higher elevations in Ceylon, also flowers, I believe, annually, and is only second in beauty to **amabilis**, and might also be introduced. **S. rubicundus**, described in the same place (fig. Bedd. "Ic. Pl. Ind. Or." t. 199), found in Wynad and Coorg at 2,000 3,000 feet elevation, also flowers annually. It, also, would well repay introduction as a very beautiful plant. All three of these belong to the paniculate section in the genus, and are quite smothered with flower when in bloom.

Dyerianus, **isophyllus**, **coloratus**, and **flaccidifolius** are the species most often met with in our stoves. The two former should be grown in all hothouses; the other species given below are fairly common. I have seen them all in cultivation, and have grown most of them.

alatus, Nees, DC. "Prod." xi. 194; (fig. "Gartenfl." t. 1243, as *S. attenuatus*).—Himalayas, Kashmir, &c., 6,000–10,000 feet elevation. Leaves petioled, ovate, acute; spikes in terminal panicles; bracts caducous, narrow-oblong; flowers all distant, 1½ inch long, purple, tube ventricose from a short constricted base. Syn. *Strobilanthes attenuatus*, "Gartenfl." t. 1243; *S. reflexus*, Nees. **anisophyllus**, Nees in "Wall. Pl. As. Bar." iii. 88; (fig. "Bot. Mag." t. 8404).—Khasia Hills, 1,000–4,000 feet elevation. Leaves very

unequal, lanceolate, serrate, acuminate, otherwise as in *isophyllus*.
Syn. *Ruellia persicifolia*, "Bot. Reg." xii. t. 955.

auriculatus, Nees in "Wall. Pl. As. Rar." iii. 69; (fig. Bedd. "Ic. Pl. Ind. Or." t. 210).—Central India, in the plains. Leaves sessile, auriculate; spikes strobiliform, linear, oblong, velvety, 3-4 inches long; bracts obovate, obtuse; flowers 1 inch, pale purple, tube curved.

callosus, Nees in "Wall. Pl. As. Rar." iii. 85; (fig. "Bot. Mag." t. 7538).—Central India. Leaves elliptic, acuminate; spikes strobiliform, more or less cymose, up to 4 inches long; bracts nearly 1 inch long, orbicular or elliptic; corolla $1\frac{1}{2}$ inch long, blue, tube ventricose upwards.

coloratus, Nees in "Wall. Pl. As. Rar." iii. 89; (fig. "Bot. Mag." t. 6922).—Sikkim, 2,000-4,000 feet elevation. Leaves elliptic, caudate at apex, serrate, glabrous, purplish beneath; panicles spreading, loose, capillary, very compound, leafless and bractless; bracts elliptic, early caducous; corolla $1\frac{1}{2}$ inch, delicate pale blue, tube ventricose.

consanguineus, Nees, DC. "Prod." xi. 104; (fig. Bedd. "Ic. Pl. Ind. Or." t. 216).—South Indian mountains, up to 5,000 feet elevation. Leaves ovate, acute, long-petioled, entire or crenate; spikes 3-4 inches, filiform, simple or branched, glabrous or hirsute; flowers white or pale blue, $\frac{3}{4}$ inch long; bracts ovate-lanceolate, glabrous or hirsute; corolla ventricose from a contracted base; stamens 2 only. Mr. Clarke makes two varieties, but to me (I have gathered quantities in various localities) it is all one slightly variable species.

cuspidatus, Nees in "Wall. Pl. As. Rar." iii. 99; (fig. Bedd. "Ic. Pl. Ind. Or." t. 221).—S. India, mountains 4,000 to 7,000 feet elevation. Leaves ovate, long-petioled, white, silky underneath; spikes linear-oblong, 3 inches long; bracts elliptic, $\frac{3}{4}$ inch; corolla 1 inch, blue-purple, nearly glabrous; stamens 2 only.

Dalhousianus, Nees, DC. "Prod." xi. 174; (fig. Wight, "Ic." t. 1509).—Himalayas, 6,000-8,000 feet elevation. Leaves elliptic; flowers in capitate heads; bracts small, caducous; corolla 2 inches long, glabrous, purple. I have had this in cultivation for many years, raised from Indian seed; it flowers well every summer. See Collett, "Fl. Siml." p. 373.

Dyerianus, Mast., "Gard. Chron." 1893, i. 442; (fig. "Bot. Mag." t. 7574).—Penang. Leaves ovate, acuminate, richly coloured with bright rosy-purple all over the centre of the leaf; spikes axillary, small; flowers pale blue, $1\frac{1}{2}$ inch long, funnel-shaped. Generally grown for its very lovely coloured leaves. Young rooted cuttings in small pots are most effective. It is a weedy-looking plant when it grows large and flowers, as it then loses the colour in its leaves. Young plants should be constantly reared in the propagating frame, the old plants being thrown away. It is scarcely worth growing for its flowers; it flowers annually. See also "Jour. of Hort." xxvi. p. 359, t. 66.

flaccidifolius, Nees in DC. "Prod." xi. 194; (fig. "Bot. Mag." t. 6947).—Assam, Burma, 1,000 to 4,000 feet elevation. Glabrous. Leaves elliptic; spikes forming rather dense panicles; flowers many, remote, 2 inches long, purple; tube curved; bracts petioled, ovate, deciduous.

glomeratus, Nees, DC. "Prod." xi. 173; (fig. "Bot. Mag." t. 3881, as *Goldfussia glomerata*).—Khasia Hills and Burma, 1,000 to 3,500 feet elevation. Leaves ovate, acute, serrate, hairy; flowers capitate, the heads $1\frac{1}{2}$ inch long; bracts persistent, 1 inch, herbaceous, softly hairy; corolla about 2 inches, purple, ventricose upwards from a cylindric base.

var. **speciosus**, "Bot. Mag." t. 4767.

gossypinus, Anders., "Jour. Linn. Soc." ix. 466; (fig. Bedd. "Ic. Pl. Ind. Or." t. 198).—Sispara, on the Nilgiris, 5,000 feet elevation. Stems, under surface of leaves, and inflorescence densely covered with creamy-white cottony down; spikes axillary, simple or ternate; bracts lanceolate, obtuse; corolla $1\frac{1}{4}$ inch, ventricose above from a short-curved cylindric base; stamens only 2. See "Bot. Mag." t. 7790.

I had this in cultivation for some years, raised from seed brought from India; it was also in cultivation at Kew. Small rooted cuttings were very effective in small pots only for the foliage. The leaves are densely silky above when young, though nearly glabrous in age. The densely woolly stems and under surface of the leaves make it very attractive. When after eight or ten years my old plants flowered, they died without seeding, and all the cuttings behaved in the same way. It is also, I believe, lost at Kew, probably in the same manner.

isophyllus, Nees in "Wall. Pl. As. Rar." iii. 88; (fig. "Bot. Mag." t. 4363). Syn. *Goldfussia isophylla*.—Khasia Hills, and much cultivated in India. Leaves linear-lanceolate, glabrous; flower-heads terminal, numerous, small-cymed, $\frac{1}{2}$ inch in diameter, 1-4-flowered; bracts elliptic, obtuse, caducous; corolla 1 inch, pale blue, tube curved, cylindric, base much shorter than the ventricose portion, lobes short, round. Very common in our conservatories. It should be raised every spring from cuttings, as these grow away rapidly and flower better than the old plants; it flowers more freely if rested about August or September and placed in the open air for three weeks.

Kunthianus, Nees in "Wall. Pl. As. Rar." iii. 88; (fig. Wight, "Ic." t. 448).—Nilgiris, 5,000-7,500 feet elevation. Leaves elliptic, serrate, rigid, strongly nerved beneath; spikes 3 inches long, hairy; bracts $\frac{1}{2}$ inch, ovate; flowers 1 inch, bluish, tube ventricose from near the base; stamens 2 only.

Micholitzii, "Gard. Chron." (1907), xli. p. 246.—Sumatra. A half shrubby plant, 4 feet. Stem 4-angled; leaves lanceolate, 6 by 2 inches, one much larger than the other; petiole 1 inch; racemes axillary, numerous, cone-like, about $\frac{3}{4}$ inch; bracts rounded, white, green-tipped; flowers white, shortly exserted from the cone. Lately introduced by F. Sander.

Sabinianus, Nees in "Wall. Pl. As. Rar." iii. 86; (fig. "Bot. Reg." t. 1298). Syn. *Ruellia Sabiniana*.—Khasia Hills, 1,000–4,000 feet elevation. Leaves petioled, broadly elliptic, serrate, upper ones often sessile, cordate; spikes strobiliform, linear, pubescent, 4 inches long, mostly solitary; bracts obovate, obtuse, $\frac{1}{4}$ inch; corolla $1\frac{1}{4}$ inch, nearly glabrous, lavender, tube curved, ventricose upwards from a very short curved cylindric base. See also "Bot. Mag." t. 3517. Not uncommon in cultivation.

scaber, Nees, "Wall. Pl. As. Rar." iii. 84; (fig. "Bot. Reg." xxvii. t. 82). North India and Burma, in the plains. Leaves elliptic, acuminate, scabrous; spikes dense, often clustered, 2 inches long, hairy; bracts lanceolate, 1 inch long, hairy; corolla 1 inch, yellow, hairy inside, ventricose from a cylindric base; lobes rounded.

sessilis, "Wall. Pl. As. Rar." iii. 85; (fig. "Bot. Mag." t. 3902); Wight, "Ic." t. 1511.—Nilgiris, higher ranges. Leaves sessile, ovate, acute, hairy; spikes cylindric, strobiliform, 1–2 inches, short-peduncled, axillary and terminal; bracts large, ovate, $\frac{3}{4}$ inch; corolla $1\frac{1}{4}$ inch, purple, nearly straight, ventricose from a cylindric base; flowers annually. *S. sessiloides*, Wight, "Ic." t. 1512, is the same plant or a slight variety.

Thomsonii = **Wallichii**.

Wallichii, Nees, "Wall. Pl. As. Rar." iii. 87; (fig. "Bot. Mag." t. 5119).—Himalayas, 7,000–11,000 feet. Leaves petioled, elliptic, acuminate, nearly glabrous, upper ones sessile, cordate; spikes lax, 1-sided, 6 inches long, often flexuose; flowers solitary or paired, lower bracts often large leaf-like; corolla $1\frac{1}{4}$ inch, blue, nearly straight, ventricose upwards from a cylindric base. Syn. *Goldfussia Thomsonii*.

The four following species were raised from Indian seed by Mr. W. Bull, Chelsea, and sent out by him in 1868. They may be still in cultivation, but I have not seen any of them except in the herbarium.

divaricatus, DC., "Prod." xi. 176.—Himalayas, 8,000–9,000 feet elevation. Leaves elliptic, acuminate, glabrous, serrulate; spikes axillary and terminal, very lax, divaricate; flowers distant; bracts small, caducous; corolla $1\frac{1}{2}$ inch, purple, tube curved, ventricose.

inflatus, Anders., "Jour. Linn. Soc." ix. 476.—Sikkim, 5,000–8,000 feet elevation. Villous. Leaves elliptic, acuminate, serrate, hairy on both sides; spikes 1–3 inches, villous, flexuose or twisted and 1-sided; lower bracts leaf-like, upper spatulate; flowers $1\frac{1}{2}$ inch, funnel-shaped, much curved, pubescent outside.

pectinatus, Wall., "Cat." No. 2356; Anders. "Jour. Linn. Soc." ix. 474.—Himalayas, 4,000–7,500 feet elevation. Leaves elliptic, acuminate, serrate, rather hairy, villous beneath; spikes capitate, short-peduncled, ellipsoid, heads 1 inch, hairy; bracts 1 inch, ovate, truncate, or pectinate; corolla about 2 inches, pale purple, wide funnel-shaped, nearly glabrous.

secundus, Anders., "Jour. Linn. Soc." ix. 480.—Assam. Leaves elliptic, nearly glabrous; spikes 1 foot long, lax, whip-like, sparingly branched; flowers distant in opposite pairs; bracts petioled, ovate,

deciduous; corolla $1\frac{1}{2}$ inch, pubescent, yellow, with a brownish tube, tube curved upwards, base cylindric.

Strobilorrhachis prismaticus = **Aphelandra Hydromestus**.

Thunbergia, L.—This is about the only genus in the order with climbing species; other genera yield scandent or straggling plants (such as *Asystasia scandens* and *Adhatoda cydoniaefolia*), but not true climbers. All the species have beautiful flowers and are great favourites in our conservatories and stoves.

affinis, S. Moore, "Jour. Bot." xviii. (1888) 5; (fig. "Bot. Mag." t. 6975).—Tropical Africa. Stem quadrangular, rambling; leaves elliptic, entire, short-petioled; flowers subsolitary, corolla violet, tube yellow, curved above the base. The figure in "Bot. Mag." is the variety **pulvinata**. Closely allied to *erecta*.

alata, Hook., "Ex. Fl." t. 177; (fig. "Bot. Mag." t. 2191 and t. 3512).—Tropical Africa; cultivated and run wild in India. Softly villous. Leaves ovate, cordate, petioles winged; calyx 12-cleft; corolla $1\frac{1}{2}$ inch, the tube curved, limb campanulate. There are several varieties only differing in the colour of the flowers: yellow, yellow with black eye, orange or dark yellow, the same with black eye, pure white. This is a very showy greenhouse climber, and should be grown by everyone possessing a conservatory; it answers well in very small pots. It is annual, and should be sown early in the spring; it makes a show all the summer. See also "Flor. des Serres," fig. 415.

angulata, Hilsenb. & Boj. ex Hook. "Exot. Fl." iii. t. 166.—Madagascar. A graceful climber. Leaves broad, angularly cordate, on very long petioles; flowers axillary, solitary, opposite, on long peduncles; bracts 2, large, ovate, 1-nerved, ciliate; calyx cup-shaped, multifid; corolla 1 inch long, tubular, swollen upwards, pinkish-blue.

atriplicifolia, E. Mey. in "Dreg. Zwei Pfl. Docum." 226.—South Africa. Stems hirsute; leaves sessile, lower ones ovate, obtuse, with mucro, upper oblong, acute; corolla yellow, infundibuliform, tube narrow, limb spreading. Allied to *capensis*.

Lately introduced. Not a good grower. I have not succeeded in flowering it, though I have had it for two years.

capensis, Retz in "Phys. Sell. Handb." i. 1776, 163; (fig. Lodd. "Bot. Cab." t. 1529).—Cape of Good Hope. Leaves nearly round, toothed, obtuse; petioles very short, hairy; flowers yellow; calyx tubular-campanulate.

chrysops, Hook. (fig. "Bot. Mag." t. 4119).—Sierra Leone. Leaves cordate, angular; calyx truncate; corolla campanulate, infundibuliform, the tube yellow, much contracted at base, limb purple; peduncles axillary, solitary, 1-flowered, shorter than the leaves. See also "Fl. des Serres," 1-5; Paxton, "Bot. Mag." t. 221.

coccinea, Wall., "Tent. Fl. Nep." 49, t. 37; (fig. "Bot. Mag." t. 5124).—India and Burma. Leaves elliptic, toothed; racemes lax, pendent, elongate, up to 18 inches; bracts 1 inch; calyx a rim only; flower red, tube 1 inch long. Frequently grown in our stoves.

Dregeana, Presl., "Bot. Bemerk." 94; (fig. Woods, "Natal Plants," t. 280).—South Africa. Leaves cordate-ovate or hastate, toothed or angular; petioles up to $1\frac{1}{2}$ inch, not winged; bracteoles $\frac{3}{4}$ inch, elliptic; corolla yellow, tube $\frac{3}{4}$ inch, limb $1\frac{1}{4}$ inch in diameter.

erecta, Anders., "Jour. Linn. Soc." vii. (1864) 18; (fig. "Bot. Mag." t. 5013).—Tropical Africa. An erect stove shrub. Leaves opposite, ovate or oblong; flowers axillary, solitary; corolla dark blue, orange throat, yellow tube. Syn. *Meyenia erecta*. Constantly met with in our stoves; if well pruned in after flowering and given a rest, in the autumn it flowers again freely.

var. **alba**.—Flowers white.

fragrans, Roxb., "Fl. Ind." iii. 83; (fig. "Bot. Mag." t. 1881).—India, up to 7,000 feet elevation. Leaves cordate or hastate at the base, toothed; flowers axillary, pure white, $1\frac{1}{4}$ inch long, on 1-3-inch pedicels; bracteoles $\frac{3}{4}$ inch, broadly falcate, oblong. A very pretty, small, greenhouse climber. It is perennial, and cuttings should be put in every spring to replace the old plants.

grandiflora, Roxb., "Fl. Ind." iii. 84; (fig. "Bot. Mag." t. 2866).—North India. A very large climber. Leaves ovate or lanceolate, angled and lobed; racemes densely flowered; flowers 3 inches broad and long, blue.

var. **alba**.—Flowers white.

A magnificent creeper for very large houses. Unless constantly attended to, it soon becomes a depot for mealy bug, and finishes by being cut down and thrown away.

Hawtayneana, Wall. "Pl. As. Rar." ii. 52, t. 164; (fig. Paxt. "Bot. Mag." vi. t. 147).—South India hills. A nearly glabrous rambling shrub. Leaves cordate to ovate, entire; pedicels short, axillary, solitary; calyx an entire ring; bracteoles 1 inch, ovate, nerved; corolla $1\frac{1}{2}$ inch, violet-purple, tube yellowish. See also Wight, "Icones," t. 1487. A very beautiful plant when in flower.

Harrisii=**laurifolia**.

Hookeriana, Lindau, "Engl. Jahrb." xvii.; "Deibl." 41, 38; (fig. "Bot. Mag." t. 6677).—East Tropical Africa. Leaves lanceolate, entire or lobed, up to 3 inches long, short-petioled; cymes short, 2-flowered; corolla $1\frac{1}{2}$ inch long, the lobes broadly obovate, blue. Syn. *T. Kirkii*.

laurifolia, Lindl., "Gard. Chron." (1856), 260; (fig. "Bot. Mag." t. 4985 and 4998).—Malay Peninsula. Quite agreeing with *grandiflora* except that the leaves are smaller, elliptic, or oblong, and scarcely angled or lobed. See also "Fl. des Serres," t. 1275; "Ill. Hort." (1857), t. 151; "Gartenflora," ix. 281 and xiv. 475.

mysorensis, Wight, "Icones," t. 871, as *Hexacentris mysorensis*; (fig. "Bot. Mag." t. 4786).—Nilgiri Hills, South India. Leaves elliptic, cuneate or rounded at base, toothed; racemes elongate, pendent, lax; bracts inconspicuous; bracteoles 1 inch, elliptic, purplish-green; corolla $1\frac{1}{2}$ inch, mouth 2 inches in diameter, tube purplish, limb yellow. A very beautiful climber, very rare in cultivation.

natalensis, Hook. (fig. "Bot. Mag." t. 5082).—South Africa. Leaves sessile, ovate, sinuate, serrate, glabrous above; peduncles axillary, solitary, erect, 1-flowered; flowers handsome, blue, tube yellow, 2 inches long, curved upwards. A very fine species, common in cultivation. Nearly hardy.

primulina, Hook. (fig. "Bot. Mag." t. 7969).—Uganda, 8,000 feet elevation. Perennial, silky-hairy. Leaves short-petioled, rhomboid, ovate with a small lobe on each side; flowers axillary, solitary, primrose-yellow, an orange-coloured rim round mouth of tube, $1\frac{1}{2}$ inch across; peduncles $\frac{1}{2}$ inch; bracts ovate, oblong, nearly as long as corolla tube; calyx very short, glandular, multifid; corolla tube nearly cylindric, slightly curved.

Vogeliana, Benth. in Hook. "Niger. Fl." 476; (fig. "Bot. Mag." t. 5389).—Tropical Africa, Fernando Po. Leaves large, ovate or oblong; flowers violet with yellow throat. A fine erect shrubby species, much like *erecta*.

T. Wightiana, Anderson (*Schmidia bicolor*, Wight, "Icones," t. 1848)—a very beautiful climber found about Sispara on the Nilgiri Hills—has never, I believe, been introduced; it is a beautiful species.

Thyrsacanthus

barlerioides, Nees in "Mart. Fl. Bras." ix. 98; (fig. "Fl. des Serres," t. 986).—Minas Geraes. Stem erect, succulent. Leaves up to 9 inches by 3, sessile; thyrses terminal, subsessile, whorls about 6 inches long, many-flowered; corolla red, $1\frac{1}{2}$ inch, glabrous; tube narrow-cylindric, slightly curved, lobes ovate, obtuse; bracts $\frac{1}{2}$ inch long, subulate.

bracteolatus, Nees in DC. "Prod." xi. 325; (fig. "Bot. Mag." t. 4441).—Colombia. Shrubby. Leaves 6 inches by 2, oblong-lanceolate, long, acuminate, glabrous; thyrses short, terminal, obtuse, pubescent; bracts lanceolate-subulate; corolla red, $1\frac{1}{2}$ inch long, much curved, viscid-pubescent, upper lip bifid, lower 3-parted, spreading, tube suddenly bent at an angle from about the middle, and above this funnel shaped.

callistachyus, Nees in DC. "Prod." xi. 326; (fig. "Gartenfl." t. 1054).—Mexico. Leaves oblong, acute, wrinkled, petioled; spike straight, naked; sepals pubescent, acuminate; corolla red, glabrous, glandular within, upper lip bilobed, lower one deflexed. See also Paxton, "Fl. Garden," ii. 58.

Lemairianus = **strictus**.

lilacinus = **callistachyus**.

nitidus, Nees in DC. "Prod." xi. 327.—West Indies. Shrubby. Leaves oblong-lanceolate; racemes compressed at the base; flowers red, $\frac{1}{4}$ inch long, bilabiate, lobes drooping, subequal, oblong, as long as the tube.

rutilans, Planchon (fig. "Fl. des Serres," t. 732); "Rev. Hort." 1862, ser. 4, i. p. 161; "Belg. Hort." 1865, p. 97, f. 7, 8; Paxton,

"Fl. Gard." iii. 78, f. 266.—Colombia. Leaves sessile, oblong-lanceolate, with a long acumination at the apex, entire or obscurely dentate; racemes axillary and terminal, 1 foot or rather more long, pendent; flowers crimson, solitary in the axils of the bracts, the lower ones often twin or ternate; corolla tubular, ventricose except quite at the base, slightly contracted at the apex, lobes very small, equal, erect; stamens included in the tube.

This species is the one most grown, and is in evidence often at flower shows. It is a charming winter-flowering stove plant. The easiest treatment is to put in cuttings every spring after the plants have finished flowering; these, if grown on in good heat and well pinched in, flower well the next winter without any special treatment as to rest, &c. If large plants are required the old ones must be potted on into larger pots and well fed, but without much care and attention the result is leggy and unsightly specimens. These larger specimens are very grand when well done.

Schomburgkianus, Hook., "Jour. of Bot." iv. (1845), 686 (not figured).—British Guiana. This has not, I believe, been introduced; it is very closely allied to *rutilans*, but the corolla lobes are larger and rather unequal, and the stamens are well exerted beyond the corolla tube; the leaves also are broader. There are specimens in the Herbarium at Kew. It has been confounded with *rutilans* in Nicholson's "Dict."

strictus, Nees, DC. "Prod." xi. 324; (fig. "Bot. Mag." t. 4378).—Honduras. Leaves oblong, acuminate, thyrses terminal, elongate, simple, narrow, 1 foot long; bracts subulate; flowers fascicled, red; corolla 1 inch long, lobes oblong acute. Syn. *Eranthemum coccineum*, "Fl. des Serres," t. 240; *Justicia longiracemosa*.

Warpuria

clandestina, Stapf, "Kew Bull." 1908, pt. vi. p. 261—Madagascar.

A small low herb. Leaves lanceolate, slightly scalloped, strigose on the midrib above and margins (under the lens), veins hairy on lower surface, of a peculiarly beautiful crystalline pale green above, with a broad zigzag intensely black band down each side of the midrib; inflorescence a small globular head of very minute flowers, mixed with strigose bracts on a longish, axillary, strigose peduncle.

This interesting foliage plant has been recently described as a new genus by Dr. Stapf. The leaves are exceedingly beautiful, and in its way it is quite a gem; the flowers, which are most insignificant, should be cut off as they appear.

Whitfieldia

lateritia, Hook. (fig. "Bot. Mag." t. 4155).—Sierra Leone. Stove shrub. Leaves opposite, ovate, subcoriaceous; racemes terminal; flowers brick-red, solitary in the axils of the bracts, subcampanulate; calyx brick-red, ample, half length of corolla. See also "Fl. des Serres," 82. A very handsome stove shrub.

COMMONPLACE NOTES.

BY THE SECRETARY, SUPERINTENDENT, AND EDITOR.

STATISTICS OF INTEREST TO BRITISH HORTICULTURISTS.

THE following statistics upon Imports of Fruits and Vegetables will be of interest to British Horticulturists, and are a continuation of those to be found on page 700 of volume xxix. part iv. of the JOURNAL R.H.S. The figures are compiled from the Board of Trade returns for 1907 :

TABLE I.—SHOWING THE IMPORTS OF FRUIT AND VEGETABLES DURING 1905-7.

	Quantities			Values		
	1905	1906	1907	1905	1906	1907
FRUIT :				£	£	£
Apples, raw . . . (cwt.)	3,494,660	2,808,732	3,526,213	2,066,193	1,763,577	2,231,327
Apricots and Peaches, raw . . .	23,321	7,646	38,414	81,962	17,967	78,583
Bananas, raw . . . (bunches)	5,737,914	6,425,704	6,232,188	1,770,256	1,903,639	1,771,095
Cherries, raw . . . (cwt.)	186,682	191,106	165,412	253,042	245,906	199,489
Currants, raw . . . "	82,286	106,718	109,130	94,408	139,773	142,245
Gooseberries, raw . . . "	17,159	39,371	45,603	11,941	22,921	25,994
Grapes, raw . . . "	700,060	690,371	798,377	761,632	667,969	769,301
Lemons . . . "	837,028	849,935	882,233	419,019	440,406	421,599
Lemons . . . "	159,258	126,296	161,918	843,679	529,164	680,604
Nuts : Almonds . . . "	803,697	727,260	702,598	735,691	683,418	749,538
" other nuts, used as fruit . .	5,068,526	5,230,911	6,120,185	1,949,196	2,183,411	2,454,569
Oranges . . . "	417,919	576,573	500,112	407,817	572,274	478,611
Pears, raw . . . "	180,211	891,113	325,761	524,073	768,720	345,720
Plums, raw . . . "	29,399	52,164	44,178	40,120	64,777	54,186
Strawberries, raw . . . "	502,097	501,345	538,465	351,143	388,598	339,462
Unenumerated, raw . . . "	—	—	—	—	—	—
FRUIT, DRIED :						
Currants . . . "	—	—	—	921,802	1,648,410	1,375,160
Raisins . . . "	—	—	—	973,836	1,106,889	1,208,402
VEGETABLES, RAW :						
Onions . . . (bushels)	7,587,025	8,310,534	8,645,048	1,094,802	953,615	1,036,231
Potatoes { From Germany . (cwt.)	25,686	137,396	785,647	4,988	23,508	145,796
" France . . . "	1,937,262	1,659,868	2,907,389	621,049	536,449	853,075
" Channel Islands . . . "	1,122,980	1,170,372	1,917,510	563,121	501,695	712,694
" Other countries . . . "	578,302	852,151	2,518,917	214,549	270,375	630,052
Total	8,664,290	3,819,787	8,249,463	1,404,607	1,332,027	2,371,617
Tomatoes . . . (cwt.)	1,137,193	1,124,700	1,135,594	970,579	953,475	1,020,795
Unenumerated	—	—	—	419,762	404,928	365,230
FLOWERS, FRESH . . . value £	—	—	—	202,217	233,884	233,641

Table No. 2 gives comparisons of the Imports for 1907, with the averages of those for the six years 1902 to 1907.

TABLE II.—SHOWING THE AVERAGE OF THE LAST SIX YEARS' IMPORTS COMPARED WITH 1907.

	Quantities		Values	
	Six years' average	1907	Six years' average	1907
FRUIT :	Thousands	Thousands	in £1,000	in £1,000
Apples, raw (cwt.)	3,503	3,526	2,146	2,231
Apricots and Peaches "	18	39	39	79
Bananas, raw (bunches)	4,700	6,232	1,514	1,771
Cherries, raw (cwt.)	180	165	233	199
Currants, raw "	94	109	120	142
Gooseberries, raw "	33	46	21	26
Grapes, raw "	726	798	736	769
Lemons "	923	882	419	422
Almonds "	151	162	558	661
Other nuts, used as fruit "	752	703	678	750
Oranges "	5,828	6,120	2,235	2,455
Pears, raw "	467	500	456	479
Plums, raw "	554	326	550	346
Strawberries, raw "	39	44	53	54
Unenumerated, raw "	565	538	368	339
FRUIT, DRIED :				
Currants "	—	—	1,158	1,375
Raisins "	—	—	1,108	1,208
VEGETABLES, RAW :				
Onions (bushels)	8,177	8,645	1,027	1,036
Potatos (cwt.)	6,764	8,219	1,957	2,372
Tomatos "	1,065	1,136	934	1,021
Unenumerated "	—	—	418	365
FLOWERS :				
Fresh "	—	—	238	234

ONCOCYCLUS IRISES.

W. R. Dykes, Esq., M.A., F.R.H.S., of Charterhouse, Godalming, sends us the following account of an interesting and suggestive experiment in the cultivation of these beautiful but difficult plants. The treatment is, of course, only in the experimental stage, but the success that has attended it warrants perseverance :—

"Everyone who has grown these wonderful Irises, at least in Great Britain, knows that perhaps the chief difficulty in their cultivation arises from the fact that, whether the roots are in the ground or out of it, they begin to sprout in the autumn, and these tender shoots often fail to resist the alternate periods of frost and of warm and muggy weather that usually make up our winter. In their homes in Asia they must be frozen hard all through the winter months and unable to grow until the snow melts in spring. In order to reproduce these conditions as nearly as possible I packed up a few rhizomes in August 1907 in dry moss in a wooden box, and sent it to the Imperial Cold Stores Co. at South Tottenham. There the box remained in a temperature of 28° to 30° F. until the first week in March. On opening the box I found the rhizomes in precisely the same condition as when they were packed up. They were planted on March 9, and soon made healthy, if somewhat slender, growth in warm sandy soil, with a good layer of old cow manure a foot beneath

the surface. The first to flower was a variety of *I. lupina*, which bloomed on May 31, followed a few days later by one or two other species.

"At present (July 14) the plants are growing vigorously and do not yet show any signs of going to rest. As soon as I see any signs of this I shall cover the plants with a light for a few weeks, and then, I think, store the same roots again, planting them, however, about a fortnight earlier than I did last season. The flowers were undoubtedly small, but the growth has been so far successful that there is at least some hope that this may be a method of acclimatising newly imported rhizomes; for hitherto it has probably been common experience that the first winter is the most critical period, and that plants which survive that ordeal have subsequently proved easier to cultivate."

BARREN STRAWBERRY PLANTS.

Every year we have complaints about the non-fruiting of strawberry plants, but this year the complaints are more numerous than usual. We think there are two principal causes—(1) propagating from barren plants and (2) a want of fresh stock. It is well known that barren plants produce the earliest and strongest runners, and the man sent to layer or take runners usually selects the strongest and best he can get, irrespective of whether the parent plant was fruitful or not. These are planted in beds or rows, and a greater number of plants are unfruitful than usual. Runners are again taken, the best being selected, until the majority of the plants in the beds bear no fruit. Some years ago we carefully chose runners from barren plants, giving them special attention, but not one runner developed into a fruitful plant. We again took runners for two years following, but in every case the result was the same.

We all know how essential it is to change our seed of corn, potatoes, and other crops, and unless we can give a change of soil it is equally necessary to occasionally introduce fresh stocks of strawberries, if we desire to maintain vigour and fertility. Some varieties, like Royal Sovereign, will go on bearing very satisfactory crops for much longer periods than others, but we think the quality suffers. Another cause of failure, or partial failure, is the planting of Strawberries where Strawberries were grown before. No good gardener permits this to happen, but we find it occurring sometimes, and if the result is disappointing the blame is entirely the planter's. By a little management even in a small garden a fresh place can be given for the new Strawberry bed, instead of replanting upon the site of the old.

SPARTIUM JUNCEUM.

Shrubs that flower freely in July and August are none too plentiful, and yet how seldom do we see this beautiful old plant? In many gardens even of considerable extent not one is to be found, and yet what a splendid effect it makes, either as a single bush or in masses! This is the true Spanish Broom, though sometimes the early yellow Broom is called the Spanish, but this is far better both in size and brilliancy of flower. Again, the flowering season of *Spartium junceum* is much later, coming when few shrubs are in blossom. To see the plant at its best it should be planted on a bank or mound in full sun; there it grows rapidly, and

is one mass of drooping bright buttercup-coloured blossoms. It is not at all fastidious about soil, growing equally well in poor or rich ground, and is easily raised from seeds or cuttings.

TWO GOOD CAMPANULAS FOR GROWING IN GRASS.

Both *Campanula latifolia* and *C. lactiflora* are admirably adapted for growing in the wild garden, and for filling neglected or unsightly corners. The former grows quite 6 feet high at Wisley in the grass, and the latter about 4 or 5 feet high; and both are always objects of admiration in July. Both species vary in colour from pale blue to pure white, the pale blue of *C. lactiflora* being the most admired of all. Plants are easily raised from seed, and they should be grown until they are a year old before planting them out; if put out small they are unable to hold their own against grass, but if of good size, and strong when planted, they grow admirably and quickly make bold masses. In windy places they should be staked before they bloom, as the spikes or panicles are so large that the plants are blown over and spoiled. No special soil preparation is needed for these plants, as they will grow either in sand or clay.

ANTS AND APHIDES.

There can be no question as to the abounding interest that may be aroused by watching the ways of ants in the garden, though the relations that subsist between the ants and scale insects and "ant's cows" or green-fly, as well as some other points in their economy, make them objects of dislike to the garden lover. The following letter from the Rev. H. E. Bishop, M.A., of Middleton Vicarage, King's Lynn, recounts one of the most remarkable instances of the intelligence of ants that we have met with lately:

"Some gooseberry bushes are trained on a north wall. During the wet weather I noticed that many shoots were encrusted with sand and lime (somewhat like the case of a caddis worm) and on breaking this away we were surprised to find the shoot covered with aphids and the ants busy among them. I examined the cases carefully with Dr. Plowright, of Lynn, and we came to the conclusion that the ants had constructed them to prevent the aphides from being washed away by the rain. The piece broken away was repaired the next day. The upper leaves served as a roof and the sand built round left a clear passage way for the aphides and ants. Since the fine weather began the aphides and the ants are still there, but they have completely cleared away all the casings."

We once saw a quite similar thing among *Cinerarias* in a greenhouse.

BOOK REVIEWS.

"Alpine Flora of the Canadian Rocky Mountains." By S. Brown. Illustrated with Water-colour Drawings and Photographs by Mrs. C. Schaffer. 8vo., 353 pp. (Putnam, New York and London, 1907.) 12s. 6d. net.

The orders are arranged in the reverse order to that customary here. The book begins with higher cryptogams and gymnosperms, then follow monocotyledons. Of the *Incompletae* only *Salicaceae*, *Betulaceae*, *Santalaceae*, and *Polygonaceae* are represented. *Polypetalae* follow, concluding with *Gumopetalae*, the last order being *Carduaceae* (*Compositae*). The description of each species is clear and concise. The book ought to be useful to all who visit the Rocky Mountains and can study the living plants on the spot.

"List of British Plants." By G. C. Druce. 8vo., 104 pp. (Clarendon Press, Oxford, 1908.) 2s. 6d. net.

This is a comprehensive catalogue of more than British plants, for the author has included a very large number which should have no place in a British flora, being chiefly ballast plants. There are 1,100 of these "aliens," such as *Eschscholtzia*, *Bikukulla* (*Dicentra*), *Leycesteria*, and *Diervilla*; such seem to us an unnecessary burden. The author says: "The oldest generic and specific name is chosen where possible, the starting-point being 1753"; but is it wise to do this so rigidly as to put *Radicula* for *Nasturtium*? The latter is a far older name, *N. aquaticum* being the watercress in the fourteenth century. And why should *Compositae*, now universally adopted, be replaced by *Asteraceae* (Lindley)? Could not there be some compromise between modern usages and antiquity?

We note there are many "Jordanese" species under *Viola*: has every one of these been actually found in Great Britain?—as localities are not given. On the other hand *Viscum* has several varieties (perhaps not named), but no mention is made of such. We are under the impression that *Paeonia* was exterminated on Steep Holmes, by Government fortifications, but it is recorded in this catalogue.

The author has enumerated a good many supposed hybrids, as in *Epilobium* and *Salix*. These ought to be useful to students. The author has also made a useful attempt at an ecological distribution. This is a valuable suggestion to workers, who too often merely collect plants, caring nothing for the physiological aspect of distribution. Altogether, students will find the catalogue of great use.

"British Flowering Plants." By W. F. Kirby. Obl. 8vo., 215 pp. (Appleton, London, 1906.) 5s. net.

This is a little book (7 inches by 5 inches) with 120 plates, each containing two species, with details of the flowers, &c., and coloured.

They are very clear and accurate, and will assist beginners who wish to know the names and structure of the flowers. The letterpress consists of easy descriptions; so that, with the plant itself before the student, the text and figures, he ought to know all about the morphology. Ecology is entirely excluded. The book is solely confined to morphology. We think it a pity that so many foreign plants are illustrated (about twenty), such as the alpine *Rhamnus*, *Trapa natans*, *Cerithe major*, *Hemerocallis*, &c., as their presence will certainly mislead beginners, the title of the book being "British Flowering Plants." *Crocus vernus* should be purple, not yellow.

"Gardens Old and New." Vol. II. Folio. 284 pp. (George Newnes, Ltd., London, 1908.) £2 2s.

In our short notice of Vol. I. of "Gardens Old and New" we said: "A truly sumptuous volume." And the same remark applies to Vol. II. quite as fully as to its predecessor. Another seventy of the most beautiful country houses with their grand old gardens are most gloriously illustrated, nearly half the illustrations (of which there are nearly five hundred) being magnificent full-page folio ones. It is a book indeed to be proud of.

"Colour in the Flower Garden." By Miss Gertrude Jekyll. 8vo., 141 pp. ("Country Life," London, 1908.) 12s. 6d. net.

Another welcome addition to the books already written by this popular authoress, well sustaining the high standard she has set herself in her previous works. The great value of the book lies in the fact that it is full of the authoress's own experience in forming a garden, furnishing it, the making of woodland walks and glades, and the best means of providing colour-effects practically all the year round. The plans of the herbaceous borders are excellent, and so plain that a novice can understand how to plant them. In our opinion nothing is more difficult than the proper arrangement of herbaceous borders, because when a clump of plants has flowered especially early in the season, there is usually a bare or unsightly patch, more or less spoiling the border; but in the plans so carefully thought out in this book such unsightly patches are reduced to a minimum. It will take people a long time to get over the idea that nothing will grow under trees, but we can endorse fully all that the authoress has written on flowers in woods or coppices of deciduous trees. There is quite a little host of plants that rejoice in such conditions, and there are innumerable woods and plantations adjoining pleasure grounds that might be made into most charming additions to the grounds at comparatively little cost. The book is admirably printed and profusely illustrated, showing effects produced by the authoress.

"Gardening in Town and Suburbs." By Harry H. Thomas. 8vo. 176 pp. (Longmans, London, 1908.) 2s. 6d. net.

A useful book for town gardening, containing much information on the best plants to grow in or near towns. Only those who have experience can realise the enormous difficulties attending gardening in

smoky fog-laden districts. Altogether there are twenty chapters dealing with the following subjects:—"Limitations and Possibilities," "Laying-out the Garden," "Preparing the Borders," "The Mixed Flower Border," "Roses," "Carnations and Pinks," "Lilies," "Bulbous Plants," "Annual Flowers," "Climbing Plants," "Shrubs," "Plants in Tubs," "Fruit Trees," "Plants in Rooms and Bulbs in Fibre," "Roof Gardening," "The Warm Greenhouse," "The Cool Greenhouse," "The Cold Greenhouse and Frame," "Window Gardening," "Pages from a Gardener's Note-book," and these are followed by a good index. We are pleased to see the author gives each kind of plant its popular name, as many town gardeners are more familiar with 'Sweet William' than with its botanical name of *Dianthus barbatus*, and so on with other plants; the simplicity of its plant names and its concise, clear, practical advice enhance the value of the book very much for the class of readers for whom it is specially written. The chapter on Annuals is a most useful one. The seed is sown in early spring, and the plants grow and flower gorgeously at a period when fogs are absent or nearly so, and we are sure annuals are not so much employed for the decoration of the town garden as they should be. In the chapter on Shrubs we should like to have seen more space devoted to the planting of evergreen trees and shrubs for screens, as deciduous trees leave a garden very bare and exposed in winter. The author mentions *Cupressus Lawsoniana Allumi*, but we have seen this and many other conifers absolutely refuse to live in a very smoky, foggy suburb, while evergreen oaks, *Ceanothus*, and *Azara microphylla* were healthy, vigorous, and perfectly satisfactory all the year round. Again we should not plant many *Euonymus*, as it is no uncommon thing to find the bushes swarming with caterpillars. The chapter on Roses is excellent, and we commend the system of pruning to all who may be in doubt on this vexed question. The advice given in other chapters is equally reliable.

"Plant Anatomy." By Wm. Chase Stevens. 8vo., 349 pp. (J. & A. Churchill, London, 1908.) 10s. 6d. net.

The great value of a knowledge of vegetable physiology to the farmer and gardener and the greater interest such a knowledge adds to the study of other branches of botany, prompted by intellectual curiosity, as well as the newer standpoint of studying living things known as ecology, have combined to lead to the production of a considerable number of books relating to this subject. Some have taken physiology as their central theme and have borrowed illustrations from morphology and anatomy to make more clear the bearing of plant function in relation to form and structure, while others have studied form and structure in relation to function. The present book belongs to the latter class, and its aim is to direct the student to so study plant anatomy that the process of cell-differentiation and the steps by which mature tissues are made fit for their functions are revealed and "the high biological significance" of such differentiation is impressed. The author says: "It is not Nature's way to evoke cells and tissues at random, with no problems to be solved by their evolution. The tissues are not an aimless expression of the power of variability. Rather they represent the means

of the triumph of the living organisms over the conditions and forces which make up their environment."

In the first 217 pages the author gives an exceedingly interesting account of the anatomy of plants, first studying that exceeding complex thing, the simple plant-cell, and then proceeding to a discussion of the structure, origin, and function of the different plant-tissues. Each chapter has instructions for practical work to illustrate, by well-chosen examples, the matters enlarged upon in the text. The latter part of the book is occupied by instructions for carrying out practical work with the microscope and a long list of reagents and their uses, and a chapter on the micro-chemistry of plant products. Such a course as that contained in this book is admirably suited for more advanced students.

"A Text-book of Botany." By Dr. E. Strasburger, Dr. H. Schenck, Dr. F. Noll, and Dr. G. Karsten. Third English edition revised with the eighth German edition by W. H. Lang, M.B., D.Sc., with 779 illustrations, in part coloured. 8vo., 746 pp. (Macmillan, London, 1908.) 18s. net.

This well-known and excellent text-book has been brought thoroughly up to date; a great deal has been rewritten. Perhaps the relative proportions—dealing with Morphology (external, 51 pages, internal, 181 pages) and Physiology (181 pages), while Classification has 425 pages—are somewhat unequal, and we should have liked to see the principles of ecology introduced; but there appears to be little or no reference to this most important aspect of botany. Though the monocotyledons are placed as preceding dicotyledons, it is suggested (p. 522) that the former may have descended from the polycarpic dicotyledons; but no reference is made to the innumerable points of coincidence between the structure (both external and internal) of monocotyledons with aquatic dicotyledons, e.g., the rhizome of *Nymphaea* being altogether similar to that of a monocotyledon.

"Elementary Botany, Theoretical and Practical." By H. Edmonds. New edition, thoroughly revised, by Dr. J. Bretland Farmer, F.R.S. 8vo., 282 pp. (Longmans, London, 1907.) 2s. 6d.

This now well-known little book, having the advantage of Professor Farmer's revision, may safely be regarded as admirably adapted for its purpose, viz., "to completely cover the syllabus of the Oxford and Cambridge Local Examinations."

The ground covered takes us from the seed and its germination to the study of roots, stems, buds, leaves, inflorescence, fruits, and seeds. Physiology is dealt with in terse paragraphs. But something more is wanted. Having learnt all about the plant in the laboratory, the meaning of structures, their origins and adaptations to the plant's own life in nature should be pursued, for this should be the end and aim of all plant-study.

"A School Flora." By W. M. Watts, D.Sc. 8vo., 199 pp. (Longmans, London, 1906.) 3s. 6d.

The first edition of this little work was published twenty years ago, and nearly a generation of young botanists have to thank it for the assistance it has given them in "running down" the plants they

have met with in their rambles. The book is arranged on the plan of a dichotomous key and renders it very easy, as a rule, to ascertain the name of a plant found, by discovering from the plant in hand the answers to the alternatives suggested by the key. A glossary is given at the end of the book, and this is of great assistance to the beginner unfamiliar with the terms used in descriptive botany, and the main difficulty in using the key arises from some uncertainty as to the meanings of such words as "much" and "very." Another difficulty arises from the fact that the flora is not complete, but still the majority of plants occurring wild in this country are included.

The value of the book has been greatly increased by the addition of illustrations, showing by means of clear line drawings details of plant-structure. Short descriptions of the plants, with indications of their comparative rarity, complete a very useful little book.

"The Insect Book." By W. P. Westell, F.L.S. 8vo., 120 pp. (John Lane, London, 1908.) 3s. net.

A book written for those who have no knowledge of insects, and dealing with the commoner insects of the garden, the waterside, the woodland, the meadows, the house, and so on. It is written in a popular vein, and will no doubt prove welcome to many whose interest in the common things around them is beginning to awaken and lead them to ask for more. The illustrations from photographs of insects are very well done indeed.

"A Plant Book for Schools: being an Easy Introduction to the Study of Plant-life." By O. V. Darbishire, B.A., Ph.D. 8vo., 168 pp. (Black, London, 1908.) 2s. 6d.

In the preface we read: "This little book has been planned for young children [aged ten, p. 57] who are being taught at school or at home. . . . It is really intended as much, if not more, for the teachers of children."

If children have got a teacher, then no books are required at all, as the lesson resolves itself into practical examinations of the living plants with a recording of everything they see, while little drawings should be encouraged, and this appears to be what the writer insists upon.

But there is the almost invariable omission of all reference to ecology. The only allusion we can find resides in the words: "I hope that some of the photographs at least will stimulate the readers of the plant-book to go out into the country to see the plants in their native homes." Here is a good opportunity lost! *e.g.*, pl. 1 (*b*) the oak, showing undergrowth. A comparison should be made between a beech [pl. 10 (*b*) ?] and fir-wood, where there is little or none, and the reasons given. Plate 4 (*b*) and pl. 9 (*c*) of the ivy would well illustrate competition for light and the struggle for existence. Pl. 4 (*a*) illustrates ivy-stems and roots, but something might have been said as to why the roots of the "host" plant itself are all exposed, viz., by its own upheaval and exposure by rain, &c.

Pl. 12 (*c*), Sandhills, would afford another lesson on maritime ecology. With regard to the water-crowfoot the author makes a rather common

mistake: "The plant exposes as much surface as possible by having very finely divided submerged leaves" (p. 93). But if you take any complete leaf and cut out all the portions between the ribs and veins, you *reduce*, not *increase*, the amount of surface. The fact really is (as Mr. MacCallum has proved), the protoplasm is weakened by supersaturation, and cannot make full-sized leaves under water; but when the water is made denser artificially by the addition of nutritive salts, the leaves then are completely formed though submerged.

We repeat, the value of the book would have been greatly enhanced if the author had introduced simple details of ecology.

"Laboratory and Field Manual of Botany." By J. Y. Bergen and B. M. Davis. 8vo., 257 pp. (Ginn, London, 1907.) 4s. 6d.

This little book consists of three parts and a list of experiments. In the preface the authors wisely insist that "the student is not to consider himself as merely the corroborator of facts already ascertained; he is to interrogate the plant itself." In other words he is warned against cramming.

"Part I. consists mainly of studies on the Gross Anatomy and Histology, &c.

"Part II. consists of Type Studies outlining Evolution and Classification.

"Part III. is concerned with Laboratory and Field Studies, &c."

By "field studies" the authors mean "ecology," which is the application of *all* botanical study to the plant itself. This should be the final goal of the student. The authors give instruction in the field study of parasites, of carnivorous plants, of plant-protections, of pollination, of vegetative propagation, of competition and invasion, and of plant-successions. This is followed by "ecological classes," or the study of hydrophytes, mesophytes, and xerophytes, &c.

It would be a wise thing for our English writers of text and other elementary books of botany to follow suit, for we need hardly say this book is of American origin, the botanists of the United States being a long way ahead of British teachers in the matter of ecology. It is an excellent work.

"Types of Floral Mechanism: a Selection of Diagrams and Descriptions of Common Flowers arranged as an introduction to the systematic study of Angiosperms." By A. H. Church, M.A., D.Sc. Part I.: Types i.-xii. (January to April). 4to., 211 pp. (Clarendon Press, Oxford, 1908.) 21s. net.

This large book (13 inches by 10 inches) contains an enlarged coloured drawing of a section of each flower, as well as numerous pen-and-ink drawings of details. Each type is treated elaborately, carefully, and accurately under the headings Distribution, History, Description, Variation, Floral Diagram, Pollination, Monstrosities, &c. In fact nothing seems to be omitted that the observer must look for. The only danger might be that with such an exhaustive treatment before him the student may be tempted to forego his own necessary examination of living plants. Indeed the author says: "Although the text is based

on the assumption that actual specimens are available to the reader, the completeness of the scheme of illustration, and more especially the abundance of large coloured figures, will enable the student to follow each type very thoroughly from the working drawings alone." But he also says: "A close acquaintance with the methods here employed for the discussion of a single type will be found to afford the best preparation in the case of candidates for examinations requiring an elementary knowledge of floral organisation." This we take to be the real value of the work, *i.e.*, as a model for students to follow with plants not mentioned in the work. With regard to the author's method of dealing with phyllotaxis we do not see either the advantage or the correctness of his plan of using two numbers (as $8 + 13$). With regard to the hellebore, and wherever an axis has indefinite parts, as fir-cones, *all* the lower "fractions" are present below the one representing the generative spiral, *i.e.*, the most nearly vertical. The only variable element is the latter. Thus, in *Abies excelsa* $\frac{1}{2}$ is very obviously the most vertical; but in *Pinus Laricio*, &c., it is quite as obviously $\frac{1}{3}$. So that we are at a loss to see why Dr. Church selects $(3 + 5)$ or $(8 + 13)$ to represent the phyllotaxis of any organs when the most nearly vertical now stands for $\frac{1}{2}$, $\frac{1}{3}$, &c. Thus, in fig. 6, the most nearly vertical row of stamens (*i.e.*, radial in the figure) are 1, 35; 2, 36; 3, 37, &c. So that the phyllotaxis is at once recognised as $\frac{1}{3}$. It is the same in fig. 7, so that no lower fractions can possibly describe it. $(13 + 21)$, we suppose, ought to be Dr. Church's method of indicating it.

"Familiar Swiss Flowers." By F. Edward Hulme, F.L.S., F.S.A. 8vo., 224 pp. (Cassell, London.) 7s. 6d.

Books on gardening subjects, and especially on hardy plants, are so numerous that one would imagine little or nothing more could be written on the subject. Yet we find in the above work much new matter illustrated by 100 coloured plates from original drawings by the author. These drawings are mostly well done and true to nature, and add materially to the value of the book. We see many an old friend pictured, with particulars of where it is thriving best in its native habitat, and many valuable wrinkles may be learned by studying these points. We should much like to see the authorities in this country adopting the Swiss plan of protecting the native flora; the damage done is often serious, and the rooting up and taking away of pretty plants is not only selfish, but detracts very much from the enjoyment of those who love rambles in the country.

The author informs us where we can most easily find particular plants and the best time of the year to go and see them, *viz.*, not in the late summer, but before mowing has commenced and before the cows are turned out to pasture.

"The Enemies of the Rose." By George Massee, V.M.H., F.L.S., and Fred. V. Theobald, M.A., illustrated by Miss C. M. Beard. 16mo. 84 pp. (National Rose Society, 1908.) 2s. 6d. net.

We cannot speak too highly of this excellent little book, as it is full of information on the pests attacking roses, and should be read by all

who grow the Queen of flowers. The illustrations are admirably drawn and faithfully coloured, so that anyone not familiar with the pests can easily identify them: their life-history, habits, and the best means of destroying them are clearly defined. The only exception is that of "rose-tree canker." Mr. Massee says about this disease: "Unfortunately no cure is known—which is what might be expected, since the cause is unknown." Fortunately this is not a common disease, and our experience is that only delicate varieties, such as *Maréchal Niel*, are very subject to it. On page 10 there is a paragraph that deserves printing in capital letters: "There are two golden rules which should be kept in mind when waging war against insect and fungoid pests. The first is to look out for them early, and on their first appearance to at once take the necessary means for their destruction. The second is to persevere with the remedy adopted until a cure has been effected."

"*Dahlias and their Cultivation.*" By J. B. Wroe. 8vo., 90 pp. (Collingridge, London, 1908.) 1s.

This is a nicely printed little book, dealing with propagation, culture, exhibiting, the best types for garden decoration, storing, injurious and friendly insects, selections of the best varieties, &c. The matter is well up to date, and the selection of varieties is excellent.

"*The Book of the Chrysanthemum.*" By Percy S. Follwell. 8vo., 98 pp. (John Lane, London, 1908.) 2s. 6d.

A well-got-up little book, dealing with the history, culture, hybridising, judging, arrangement, the best varieties to grow for exhibition, home use and market, insect pests and diseases, &c. Although we do not find anything new in the book the matter is thoroughly practical and reliable, and the lists of varieties to grow are well up to date. It is astonishing how varieties that were popular for exhibition purposes a few years ago have practically disappeared, to be replaced by others of larger size; and we agree with the author that single varieties will become more in favour in the near future than the great unwieldy blooms of the present day. It is only amongst the rarely grown reflexed varieties that we find old familiar names of thirty or more years ago still to the fore, and when the reaction against big blooms sets in—as it is almost sure to do—we hope the beautiful reflexed varieties will not be forgotten. There is a very good index.

"*Greenhouse and Conservatory Construction and Heating.*" By Paul N. Hasluck. 8vo., 160 pp. (Cassell, London.) 2s.

This book will be very useful for the amateur who desires to erect his own greenhouse, frames, &c., as very complete directions are given on the best wood to get, how to prepare and fix it, and the average cost of material, &c. Again boilers suitable for both small and large structures are dealt with exhaustively, and most of them are illustrated—in fact they are so numerous as to be almost confusing to the novice. If smoke from the stove chimney proves a nuisance, the author shows how this may be got over, and there is a vast quantity of other valuable information for anyone contemplating the erection of glass structures.

"Les Plantes Tropicales de Grande Culture," Tome I. By M. E. de Wildeman. 8vo. 898 pp. (Castaigne, Brussels, 1908.) 10 fr.

So rapid has been the progress in recent years in the investigation of tropical diseases, and so tangible already are the results of that indefatigable research, that it is safe to predict the early dawning of an era when the European may betake himself to the tropics unburdened by that consciousness of danger to life, or, at best, enfeeblement of constitution, which has hitherto, and with good reason, been the weightiest of restricting influences upon the white man's enterprise within the tropics.

This restriction removed, widely extended attention will surely be directed towards the profitable exploitation of those vast areas, now virgin, which lie within the tropics, and literature dealing practically and scientifically with tropical agronomy is, therefore, literature in season.

But the pleasure and profit to be derived from books like the one now under review must by no means be limited to the benefit and enjoyment of a coming generation of tropical colonists; on the contrary there actually exists a very present and pressing need of that "more light," both academic and economic, on the subject of tropical vegetation and its cultivation which is afforded by the original research and carefully collected information contained in M. de Wildeman's latest work.

The object of the book is "to provide colonial administrators, and particularly agriculturists, with a rapid survey of the history of certain tropical products, and to make known the plants producing them," and the book is written primarily for the benefit of the author's countrymen and in relation to the Congo.

With clearness of exposition and without prolixity the writer's object is achieved, and although this first volume deals only with five plant subjects—Coffee, Cocoa, Cola, Vanilla, and Banana—the historical survey is but a rapid one, and what is written of these plants is all very necessary for the planter and the student of tropical botany alike to know.

Rather than with an exposition of the most profitable methods of cultivation we are furnished with the botanical history and status of the plants, which the author holds rightly to be of prime importance; with instructive descriptions of the preparation for market of the commercial products which render the plants valuable; with the history, mingled with legends, of the introduction and extension of their use in countries unsuited to produce them, as well as many useful statistics upon the quantity and quality of these products in relation to the various countries of their origin and as to the capacity to absorb them of the markets to which they are sent; and with some account of pests and diseases to which unfortunately, these, like the economic plants of temperate regions, are too generally subject, a knowledge whereof is an essential item in the equipment of the cultivator expecting to succeed.

Invaluable though a fuller treatment of the subject from a purely cultural standpoint must have been, it could hardly be expected in addition to the number and careful handling of the phases actually dealt with in the work.

In his "Introduction" M. de Wildeman strikes some notes which with happy effect may sound in the ears and echo in the memories not

only of Belgian colonists of the Congo, but of actual and possible planters throughout the tropics, irrespective of nationality.

Ignorance of the nature and habit of the plant from the cultivation of which profit is anticipated—ignorance, indeed, of the science of cultivation in any of its branches—is general enough with those who emigrate with the intention of farming the soil in any regions, but this ignorance seems to be especially remarkable in those who essay tropical planting. Knowledge preliminarily gained in the botany and culture of the plants with which the cultivator will be called upon to deal is sound insurance against failure, and a comprehension of the scientific and economic issues in tropical agronomics to be gleaned from works like M. de Wildeman's must prove of great practical value, inducing a more intelligent attitude towards an undertaking, and making for progress and enhanced efficiency in the management thereof.

If any portion of the labour expended upon this work can be characterised as more praiseworthy and effective than the remainder, that devoted to pure botany must be so deemed. The botanical characteristics of the plants are so fully and clearly treated that the work constitutes a valuable addition to the literature of botany.

The author has been at pains to collect information from the best sources, and adds to his own, with due acknowledgment, the well-sifted research of others. A list of botanists and explorers who have contributed information on the flora of the Congo, with brief descriptive notes on their achievements, is furnished, and forms very interesting reading.

The "coup d'œil" on the vegetation of Central Tropical Africa, to which the first forty pages are devoted, gives an instructive picture of actualities in that region, and conjures up a stimulating glimpse of its possibilities, the author then proceeding to treat of coffee. The desirability for a more scientific comprehension and treatment of the coffee is strongly dwelt upon, and the necessity of special attention to and experiment with "varieties" is emphasized. In this connection a warning reference is made to *Coffea stenophylla* (Highland coffee), the planting of which was recommended by Scott-Elliott in 1892, experiments in Java proving it inferior to other varieties, notably *Coffea robusta*.

For shading purposes the use, whenever practicable, of plants of economic value is urged, whereby a maximum of returns may be extracted from the planted area; and an exhaustive list (after Cook) is furnished of plants which are suitable as shade-plants in the coffee plantation.

An account, with statistics, of the coffee industry in the several countries in which it is engaged in is succinctly given. M. de Wildeman also devotes some attention to the numerous pests and diseases to which coffee is liable, and sees in thorough and scientific methods of culture supplemented by the judicious use of spraying compounds—formulae for some of which are given—the only means of avoiding heavy losses.

The treatise on coffee terminates with a very lengthy enumeration of the known species and varieties of the genus *Coffea*; but the author considers that "the systematizing of this genus is far from being complete, and may be said to be hardly more than outlined."

In like manner, and with the same evidence of conscientious research exhibited in the treatment of coffee, the author handles all the other subjects embraced in this volume. Particularly interesting is the description of the cola industry, and it seems that there is a temptation to enterprize in the evident scope which exists for the extended production of the cola nut.

The manner of this work is worthy of the matter; the language is simple and devoid of unnecessary technicalities; and the letterpress is fortified with good illustrations and useful plates. An amplified index, however, would enhance the value of the book for purposes of reference.

"The Vegetable Grower's Guide." By John Wright, V.M.H., and Horace J. Wright, F.R.H.S. Vol. I. 4to., 352 pp. (Virtue, London, 1908.) 21s.

This may be described as a companion work to the "Fruit Grower's Guide" and the "Flower Grower's Guide," by the same talented authors, illustrated and printed in the same beautiful manner, and written in the same practical and interesting style. The volume before us contains articles upon soil management, manuring, rotational cropping, the destruction of insect and fungoid enemies, the making of kitchen gardens of various sizes and forms, and the construction of glass houses, frames, &c., for forcing vegetables and salads. We recommend this book to all young gardeners, as there is no doubt that a vast number of young men have an ambition to work under glass, and look upon all outdoor work with a certain amount of disdain, forgetting that no head gardener can keep his situation if he fails to produce a certain and continuous supply of vegetables and salads; not only so, but each must be well grown, otherwise there will sooner or later be trouble in store for him. Vegetable culture should be the strongest point instead of the weakest in his knowledge and duty. First-class information is given to the market grower, which will be serviceable to the beginner, and may be read by old growers with advantage, as many valuable hints are given on the most profitable things to grow and the most advanced system of cultivation. We often hear questions as to the cost of growing a particular crop. Not only is this gone into carefully, but, so far as we can ascertain, there is all through a tendency to under-estimate the profits, which is as it should be. We venture to predict that this will be a standard work on the subject, for although there are numerous books on vegetable culture none that we have seen are on the same lines as the present. No doubt the index will be in the second volume, but we think each volume would be more serviceable with its own index.

"Soils: their Nature and Treatment." By Primrose McConnell, B.Sc. 8vo., 104 pp. (Cassell, London, 1908.) Paper, 1s. net; cloth, 1s. 6d. net.

This excellent little book deals with the general nature of soils, their physics, improvement, and tillage. It is written in a non-technical manner, and should be intelligible to the average farmer and gardener. The author is both a scientific man and a practical farmer, and these two aspects are happily wedded in this little treatise. The section on natural

vegetation, in which an attempt is made to indicate how the nature of a particular soil may be determined by an examination of its herbage, is certain to attract special attention. We do not agree in every instance with the author as to the indications which some of the selected plants give, but the information generally is so accurate that we wonder who else could have done the work so well. We most heartily recommend this book to every farmer and gardener.

"Manures for Fruit and other Trees." By A. B. Griffiths, Ph.D. 8vo., 264 pp. (R. Sutton, London, 1908.) 7s. 6d. net.

The present book might have been written as an advertisement for sulphate of iron. There is no doubt whatever that some soils are deficient in iron, and that the lack of colour in fruits, such as apples, is occasionally, if not frequently, due to this deficiency; but that lack of iron is so invariable we cannot admit as proved beyond reasonable doubt. It is, however, a subject well worthy of determination by experiment, and such work would be of incomparably greater value than continually repeated tests with the same manurial substances, a practice so extremely common. If research work should show that Dr. Griffiths is correct, then he will have deserved the greatest thanks for his persistence; but we cannot think that extended investigation will fully endorse his views. There are a few other items upon which the author differs from other investigators materially, and although he may be complimented upon having the courage to assert his convictions we hesitate to recommend this book to the general reader without commenting upon this point.

There are some valuable analyses, presumably original, and these will almost certainly be frequently used even by those who may not agree with the opinions of the author. The general tenor inclines us to the opinion that the author clings to the exploded theories on the composition of plant-ash instead of using such knowledge as merely suggestive and endeavouring by actual experiment to determine the requirements of the plant. The advice upon thorough cultivation is excellent, and there are many other very good features. It is a book full of suggestions for the experimenter and advanced worker who wishes to investigate.

"Stephen's Book of the Farm." Div. I. By J. Macdonald. 8vo. 260 pp. (Blackwood, 1908.) 10s. 6d.

We remember what a high opinion we had in our student days of an early edition of this work, but now that we examine the revised edition in the light of some years of practical experience we notice the absence of reference to many special points which personal observation and investigation have shown to be essential in many districts. However, although we feel that the various branches of farming are now best dealt with by specialists, yet we admire this work as containing a vast amount of information on practically every branch of farming.

The present volume contains nearly three hundred extremely useful figures, many excellent plates of animals, and plans of houses and buildings. The section on hedges, fences, and gates will probably prove

of great value to gardeners. The account of draining land is fuller than usual, and includes particulars of materials used and tools required, together with the cost of the various methods.

If our readers at any time require information upon any branch of farming it will be well to look into this work, for although much detail is, perhaps necessarily, omitted, yet almost certainly the reader will acquire some useful knowledge respecting his subject.

"Heredity." By Professor J. A. Thomson, M.A. 8vo., 605 pp. (John Murray, London, 1908.) 6s. net.

The problems of heredity closely concern all intelligent human beings, whether from the point of view of the breeders of plants or animals, or from that of the future of the human race. Heredity is "the organic or genetic relation between successive generations," and starting with this definition, Professor Thomson has succeeded in producing in this, the latest volume of the Progressive Science Series, a very readable and altogether excellent review of the subject. The author is an ardent disciple of Weismann, and does not attempt to hide his adherence to Weismann's germ-plasm theory, a theory which, to most botanists, does not seem a necessary one; but, although this is the case, he gives a fair and clear exposition of the other well-known theories which have been propounded to account for the remarkable facts a comparative study of the characters of parents and offspring has made known. Furthermore, he examines the results obtained by cytological investigation, by the biometricians, the Mendelians, and other investigators, in a strictly impartial manner. Some of the most interesting chapters to the general reader are those upon "Reversion and Allied Phenomena," "Telegency," and "Heredity and Disease." But probably the most important general question discussed in the volume is that concerning the transmission of acquired characters from the parent to its offspring. The question is one of the most far-reaching importance, and although some hold that this transmission is the essential fact in evolution, while others deny that such transmission is possible at all, yet an impartial summing up of the facts which are known, putting aside hypotheses, leads one only to that very useful and very unsatisfactory verdict, that the transmission of acquired characters is "not proven." The question is one which closely touches upon our everyday life, though the external heritage, which is man's, renders his case a very peculiar one, and probably one in which the result of inquiries into the question upon the extent to which such transmission occurs would be obscured by factors difficult to gauge. Indeed the whole question is beset with difficulties, but until it is solved we shall necessarily be working in the dark, and handicapped accordingly.

Important as an accurate understanding of such points as these is from a sociological standpoint, they are perhaps more readily applied in dealing with cultivated plants and domesticated animals; and there is abundant need here for their settlement, and this can only be reached after very careful experiment.

A very useful bibliography concludes the volume, which is provided with a good index.

"Cassell's A B C of Gardening." By W. P. Wright. 8vo., 341 pp. (Cassell, London, 1908.) 3s. 6d.

This will rank as one of the not least useful of the many small books on gardening written for amateurs, who, in addition to an outdoor garden, possess glass houses. The author has included an enormous number of genera in his alphabetical list, many of which are not likely to be met with in ordinary gardens, as well as the more common plants, and about each he has pithily told something of its requirements. The illustrations, which, though crude and diagrammatic, are helpful to an understanding of the text, are a feature of this book.

"Handbook of Flower Pollination." By Dr. Paul Knuth. Trans. by J. R. A. Davis. Vol. II. (II. Band, I. Teil of German edition.) Observations on Flower Pollination made in Europe and the Arctic Regions on Species belonging to the Natural Orders *Ranunculaceae* to *Stylidiaceae*. With 210 figures in the text and a portrait of Hermann Müller. 8vo., 703 pp. (Clarendon Press, Oxford, 1908.) Cloth, 31s. 6d. net.

All readers of Dr. Knuth's fascinating "Handbook of Flower Pollination" (vol. i. of which, translated by Mr. Ainsworth Davis, was reviewed in this JOURNAL, Vol. XXXI., December 1906, p. 270) must welcome the appearance of vol. ii., done into English by the same capable hand. Vol. i. described the marvellous devices and adaptations by which Nature effects the pollination of flowering plants, arranging them into three groups—Hydrophilae, Anemophilae, and Zoidiophilae—according as they are water-, wind-, or animal-pollinated. Colours, perfumes, and specific structure were considered in relation to environment and to the anatomical characters and visits of insects in particular, along with the general relations subsisting between groups of flowers and pollinating agents, which react on the structure of guest as well as host.

Vol. ii. contains the classified observations hitherto made on flower pollination in Europe and the Arctic regions. The natural orders (from *Ranunculaceae* to *Stylidiaceae*) are dealt with in sequence, with a general description of the floral structure and arrangements characteristic of each, and detailed particulars for the several genera and sub-species. This is followed for each plant by as complete an account as possible of its insect visitors and pollinators in different localities, based on the classical work of Hermann Müller and the notes of subsequent observers. Competent zoologists (Alfkin, Costa, Dahn, and others) have revised these observations on the morphology and habits of pollinating insects, and the modifications they undergo in adapting themselves to the flowers they frequent. The illustrations are admirable, and the geographical distribution of plants and insects is indicated by charts. The abbreviations employed in the bibliographies are in line, as far as possible, with those used in the "International Catalogue of Scientific Literature."

"A Practical Guide to School, Cottage and Allotment Gardening." By J. Weathers. 8vo., 248 pp. (Longmans, London, 1908.) 2s. 6d. net.

Gardening as a subject of instruction in elementary schools is steadily spreading, and its spread has called forth several new books. The present

little work deals not at all with pedagogics, but with the practical side of gardening in those directions indicated by the title. The author appears to look upon the school garden, not from the point of view of the school-master who sees in it an instrument of immense educational value in the hands of an efficient teacher, but as a training-ground for the future allotment holder and cultivator of the cottage or suburban garden, and he endeavours to give plain and straightforward directions for the carrying out of all those cultural operations which are necessary in such gardens. In this endeavour he has succeeded, and a reliable and thoroughly practical guide he has produced. The culture of all kinds of plants suitable for such gardens, both from an ornamental and an economic point of view, is well and fully dealt with, and the very plain and useful diagrams with which the book is illustrated materially assist the written instructions. As a book upon the culture of the more commonly grown plants in small gardens we are sure many will welcome it, both among amateur gardeners and teachers in elementary schools, but the latter must not expect to find in it hints upon methods of teaching.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 118, 119.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.L.S., F.R.H.S.
 Cook, E. T., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Cox, H. G., F.R.H.S.
 Drury, C. T., V.M.H., F.L.S., F.R.H.S.
 Dykes, W. R., M.A., F.R.H.S.
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 Goldring, W., F.R.H.S.
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 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
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 Reuthe, G., F.R.H.S.
 Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
 Shinn, C. H., F.R.H.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. H ^é .
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Naut. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticultura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. Königl. Bot. Berlin.
Orchid Review	Orch. Rev.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.

Journals, &c.	Abbreviated title.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Acacias (Mimosas) Mediterranean. By A. Pottier, fils (*Le Jard.* No. 505, p. 72; March 5, 1908; 1 plate and 7 figs.).—A comprehensive description of the many different ornamental Acacias and their propagation and culture.—*F. A. W.*

Acridocarpus. By T. A. Sprague (*Jour. Bot.* 522, pp. 192–207; 6/1906).—A revision of this genus of mainly tropical African Malpighiaceae. Twenty-seven species are recognised, of which three, *A. congolensis*, *A. ugandensis*, and *A. hemicyclopterus*, from the Gambia, are new and are described.—*G. S. B.*

Agricultural Education in the West Indies (*Journ. Imp. Dep. Agri. W.I.* No. 3, 1907).—Papers read on this subject at the Agricultural Conference, 1907, including observations on general science in elementary schools and scientific teaching.—*M. C. C.*

Allium. By A. B. Rendle (*Jour. Bot.* 518, pp. 41–45; Pl. 476; 2/1906).—Descriptions of six new species, *A. (Rhiziridium) tibeticum*, *A. (Rhiziridium) phariense*, and *A. (Rhiziridium) fasciculatum*, from Tibet, and *A. (Rhiziridium) Hugonianum*, *A. (Rhiziridium) plurifoliatum*, and *A. (Molium) tubiflorum*, from North Central China. The three last-named are figured.—*G. S. B.*

Apios tuberosa. By R. Melchior (*Die Gart.* No. 37, p. 485; June 13, 1908).—A well-known tuberous-rooted, deciduous, rapid climbing plant, with clusters of purple flowers. An exceptionally useful plant for screening and covering fences and hedges. It is perfectly hardy and of most easy culture.—*G. R.*

Aster alpinus var. **longipedunculatus.** By H. Rehnelt (*Die Gartenw.* No. 31, p. 362; May 2, 1908).—Described as a very fine form allied to *A. diplostephioides*. The flowers are large, lilac with yellow centre. The time of flowering is June.—*G. R.*

Balearic and Spanish Plants. By C. Bucknall (*Jour. Bot.* 580, pp. 53–59; 2/1907).—A localised list of flowering plants collected by the author and J. W. White in four short tours in Minorca and Majorca and on the mainland.—*G. S. B.*

Berberis acuminata. By O. Stapf (*Bot. Mag.* tab. 8185).—Nat. ord. *Berberidaceae*. China. Shrub, evergreen, 3–6 feet high; leaves lanceolate, spinous-serrate; flowers in fascicles, brownish-yellow.—*G. H.*

Berberis Hybrid. By E. S. Marshall (*Jour. Bot.* 539, pp. 393–394; 11/1907).—A description of a quasi-wild hybrid of *B. aquifolium* × *vulgaris* in Somerset, resembling the latter in habit armature, and foliage,

the former in fruit. The seeds are apparently perfect. Focke's remarks on the "mixed species" ("Mischart") resulting from the manifold crossing of several closely related species of the *Mahonia* section, and on the garden hybrid *B. Neubertii* are quoted.—*G. S. B.*

Bio-histological Notes on some New Rhodesian Species of *Fuirena*, *Hesperantha*, and *Justicia*. By L. S. Gibbs (*Ann. Bot.* vol. xxii. April 1908, pp. 187-205; 2 plates).—An interesting contribution to our knowledge of the biology of these South African plants. The remarkable adaptations to physiological conditions exhibited are dealt with from a biological and histological standpoint.

In the case of *Fuirena Oedipus* (Cyperaceae), a bog plant growing within the spray area of the Victoria Falls, the basal internode is curiously modified into a pseudobulb. The tissue involved is that of the cortex, and it is found to be packed with starch. Organogenic modification for storage of reserve food material is rare in the Cyperaceae, and hitherto only known in the rhizome. The tuberous swellings in the basal internodes of certain grasses serve as water reservoirs and not as food storerooms. Other species of the same genus are contrasted with *F. Oedipus*.

In species of *Hesperantha* (Iridaceae) the main interest lies in the tunics of the corms. *H. matopensis*, n. sp., is specially discussed. The persistent tunics, which are partly liquefied, are very numerous compared with the size of the corm, and they are of value in preserving moisture round the shoots. Other types of corm-tunics in Iridaceae and allied natural orders are referred to.

The last plant dealt with is one of the Acanthaceae, a highly specialised *Justicia*, *J. elegantula*. This plant possesses subterranean winter buds with colourless radical leaves; the flowers are borne on very short stems, which also bear linear cauline leaves. The shoots finally assume a dorsiventral habit, auxiliary flowering shoots arising from the nodes. The resting buds are also produced from these shoots. It is pointed out that in *Fuirena* and *Justicia*, two plants of widely differing organization and systematic position, exposed to the same physiological but rather different edaphic conditions, the direct response is on the same lines in both cases, and in the same direction, viz., to the general or physiological stimulus rather than to individual requirements.—*A. D. C.*

Bulbophyllum Binnendijkii. By R. A. Rolfe (*Bot. Mag.* tab. 8187).—Nat. ord. *Orchidaceae*, tribe *Epidendreae*. Java. Epiphyte; pseudo-bulbs, $5\frac{1}{2}$ inches long; leaves 1 foot long; flowers umbellate, seven to ten, very large, light green, with dark brown spots; sepals elongated, spirally twisted at apex, $2\frac{1}{2}$ – $3\frac{1}{2}$ inches long; petals $1\frac{1}{2}$ –2 inches long, spirally twisted at apex; lip crimson at end.—*G. H.*

Bunt, or Stinking Smut. By F. D. Heald (*U.S.A. Exp. Stn. Nebraska, Bull. No. 28*; 8 figs.; 1908).—After describing the pest, and its life history, this communication recommends the formalin treatment, as follows:—Place the seed on a clean floor; prepare the solution by adding one pint of commercial formalin to thirty gallons of water, for

wheat; sprinkle the solution over the seed and shovel it over until the surface of each grain is moistened. Shovel the grain in a heap, and cover with canvas or wet sacks. At the end of two hours uncover and spread the grain to dry. The floor and sacks should be sterilised with formalin solution before beginning operations.—*M. C. C.*

Cabbage Maggot. By F. L. Washburn (*U.S.A. Exp. Stn. Minnesota, Ann. Rep.* 1907; 22 figs.).—This pest (*Phorbia brassicae*) does considerable damage to cabbages, turnips, radishes, and other Cruciferae, particularly on light land, by the larvae making their way into the stalk and feeding upwards in the interior. Exposed fields cleanly cultivated suffered less than those sheltered, and where cabbage stalks, &c., were allowed to remain unburied. A large number of natural enemies are described and a mite (*Trombidium scabrum*) is said to be particularly useful in destroying the eggs which the fly lays at the base of the cabbage stalk. The method of placing a paper collar round the base of the stem to prevent the laying of eggs has been abandoned at this station and experiments with other methods of prevention are in progress. Good results were, it is stated, obtained by immersing the roots at the time of setting in hellebore and water, and also by the use of bran and glue and sawdust and glue placed on the earth round the base of the young plant. Carbolic emulsion made by dissolving 1 lb. hard soap in 1 gal. of boiling water to which is added 1 pint of crude carbolic acid, the whole being churned with a syringe until thoroughly emulsified, was used on infected plants with very variable results. For use the emulsion was diluted to from 15 to 85 times its bulk with water. Maggots lived from 140 min. to 220 min. immersed in the solution (1 part to 30 of water) and eggs hatched after 90 seconds' immersion.—*F. J. C.*

Calcium Cyanamide, The Manurial Value of. By Dr. R. Otto (*Gartenflora*, January 1908).—An account of experiments carried out with lettuce and kohlrabi to investigate the respective manurial values of calcium cyanamide and nitrate of soda. The cyanamide, which is not so readily washed out of the soil as the nitrate of soda, gave in both cases more satisfactory results. The lettuces, manured with nitrate, formed loose hearts, while in the case of the kohlrabi the leaf-growth was abundant at the expense of the roots.—*W. R. D.*

Campanula mirabilis, etc. By B. Othmer (*Die Gartenw.* No. 88, p. 444; June 20, 1908).—*C. mirabilis* is a low-growing bushy biennial, with ovate, rosette-forming leaves and a much-branched short stem with large lilac or pale blue flowers. A fine plant for the rockery or pot culture. It is a native of Abchasia, and was discovered in 1895. *C. Waldsteiniana*, a rare but old plant, is only a few inches in height, with close-growing, wiry stems, small glaucous leaves, and pale blue flowers in July and August. *C. barbata* and *C. barbata alba* are biennials with green hairy leaves, large bell-shaped blue or white hairy flowers in June and July.—*G. R.*

Canker Worm, The Spring. By A. L. Quaintance (*U.S.A. Dep. Agr. Bur. of Entom., Bull.* 68, Pt. II.; July 1907; 2 plates).—This insect

(*Paleucrita vernata* Peck) does much harm to apple, elm, cherry, and some other trees. The females are wingless and it is thought that the chief means of distribution is by the eggs on nursery stock. In the majority of cases the canker worms are limited to orchards which are neglected as to spraying and cultivation. The life-history is as follows. The larvae feed on the leaves in spring and then enter the soil to a depth of 2 to 5 inches, pupating in an earthen cell. The imagos appear in spring or during mild spells in winter, the female climbing up the tree to deposit her eggs in irregular masses under loose bark scales, in cracks in the bark or other such places. It is recommended that the trees should be sprayed with an arsenical spray (1 lb. for each 100 gallons to which milk of lime made by slaking 4 to 5 lb. of stone lime should be added), or arsenate of lime may be used at the rate of 6 to 10 lb. to 100 gallons of water or Bordeaux mixture. Two applications should be made, the first when the fruit buds are exposed, the second after the blossoms have fallen. This will serve to lessen both the canker worm and codling moth. The orchard should be ploughed and cultivated. To catch the females grease bands should be applied in the spring, made from printer's ink, tar, bird-lime, &c., spread on strips of paper 5 or 6 inches wide and long enough to go around the tree-trunk. The same methods are, of course, applicable in control of our winter moths.—*F. J. C.*

Canna flaccida. By B. Othmer (*Die Gart.* No. 22, p. 251; February 29, 1908).—A native of Florida and South Carolina. A water-side or bog plant, recommended for its handsome foliage, for warm positions out of doors, or for decorative purposes indoors.—*G. R.*

Cape Ivy (*Senecio scandens*, DC.). By Ad. van der Heede (*Le Jard.* vol. xxii. No. 501, p. 8; January 5, 1908; 1 plate).—*Senecio scandens*, formerly known as *Delairea scandens* or *D. odorata*, is an attractive climbing plant with yellow flowers, which, unlike many Compositae, have an agreeable scent. Its succulent green leaves resemble ivy. It grows freely in a cool house or winter garden, but must be kept dry and in the full light in winter. *S. scandens* is a native of the Cape; *S. macroglossus*, with much larger flowers, of Port Natal. There is also a variegated variety.—*F. A. W.*

Capraria frutescens. By J. Britten (*Jour. Bot.* 587, pp. 814-815; 9/1907).—This is the correct name of the plant collected at Vera Cruz by Houstoun, called *Erinus frutescens* in Miller's "Dictionary" (1768), *C. cuneatu* in "Hortus Kewensis," ed. 2, *C. saxifragaefolia* in "Bot. Biol. Centr. Amer.," and *Pogostoma saxifragaefolia* in the "Prodromus." *Erinus tomentosus* of Miller, *Stemodia lanata* of the "Prodromus," from the same place, is *S. tomentosa* by the new rules.—*G. S. B.*

Carbolineum as a Remedy for Woolly Aphis, Canker, and Rust (*Neueste Versuche und Erfahrungen mit dem Carbolineum*). Von R. Betten (*Herausgeber des Erfurter Führers in Obst- und Gartenbau in Erfurt.* 85 Pfg.).—An article in the second January number of "Gartenflora" calls attention to this pamphlet on the value of Carbolineum as an insecticide and fungicide.—*W. R. D.*

Carnations. By Le Texnier (*Le Jard.* vol. xxii. No. 502; January 20, 1908, p. 21).—Continuation of previous articles (*Journ. R.H.S.* vol. xxxiii. p. 590).—*F. A. W.*

Carnations, Bud Rot of. By F. D. Heald (*U.S.A. Exp. Stn. Nebraska, Bull.* 103; 1908; with five plates).—After enumerating ten fungus diseases attacking carnations this report describes the "bud rot," which is attributed to *Sporotrichum anthophilum* (Peck), in which two kinds of spores are produced, microconidia, nearly globose, and simple, and macroconidia, which are elongated and generally uniseptate. This mould is parasitic on the filaments and petals of carnations, discolouring them and spoiling the flowers. It is recommended to pick off all affected buds, and burn them, practise clean culture, and keep the moisture down to the minimum. A mite is constantly associated with the fungus in affected buds (also described with two plates).—*M. C. C.*

Cassava Starch, Industrial Prospects in Jamaica. By the Hon. H. H. Cousins, M.A., F.I.C., F.C.S. (*Journ. Imp. Dep. Agri. W.I.* No. 3, 1907).—This paper states the yield of tubers, their maturation and varieties; cost of production, manufacture, commercial value of cassava starch, and concludes that the intrinsic qualities of cassava starches producible in Jamaica are of a high order, and a well-made article can command a high price. It would appear that this industry offers a field for investment and development whereby large areas of land at present of small productive power could be made to yield a handsome profit.

M. C. C.

Celtis ugandensis. By A. B. Rendle (*Jour. Bot.* 526, pp. 341-2; 10/1906).—A description of a new species, with narrow entire leaves, known by the native name 'mbaliwali,' from Entebbe, Victoria Nyanza.

G. S. B.

Ceratostigma. By D. Prain (*Jour. Bot.* 517, pp. 4-8; 1/1906).—A monograph of the genus founded by Bunge on the Chinese species known in gardens as *Plumbago Larpentae*. Seven species are described, of which four are new.—*G. S. B.*

Chinese Plants, New. By S. T. Dunn (*Jour. Bot.* 540, pp. 402-406; 11/1907).—Descriptions of two new species of *Prunus*, an *Elaeagnus*, &c., from Kwantung and Hongkong, Korea, &c., from the Hongkong Herbarium.—*G. S. B.*

Chrysanthemums: Fall of Flower Buds. By A. Morel (*Le Jard.* vol. xxii. No. 501, p. 13; January 5, 1908).—In Show Chrysanthemums, e.g., 'Duchesse d'Orléans,' 'Tokio,' and 'Mlle. Debonno,' the fall of flower buds (indicated by the appearance of a horizontal slit above the bud, which then drops off before it opens) may be averted by making two or three vertical cuts, of 1-2 cm., immediately below the bud. The sap then runs out, and the fall is prevented. Another interesting observation is that of M. Poirét, who produced more vigorous plants and larger flowers, which also develop earlier, by making an annular incision in the stem, fifteen to twenty days after disbudding, 5-10 cm. from the ground.

If made nearer the root the size of the flowers is increased. A swelling forms from which new roots are thrown out, tending to greater vigour. The stems should, however, be supported after the operation, as it makes them more fragile.—*F. A. W.*

Chrysanthemum, Prevention of broken buds. (*Rev. Hort.* Jan. 16, 1908, p. 27).—The fracture of the stem just below opening buds, to which some varieties are liable, can be prevented by making four or five longitudinal incisions in the flower stem some time prior to the opening period.—*C. T. D.*

Chrysanthemum Seed, How to obtain. By J. Chiffot (*Rev. Hort.* Jan. 16, 1908, pp. 39-41; 2 figs.).—A description of the method of obtaining seed from choice varieties, first by normal cultivation, *i.e.*, without disbudding, so as to reduce abnormal development of barren florets, cross-fertilisation then being effected on selective and protective lines through the ligulate florets and into the central tubular ones which should be excised.—*C. T. D.*

Clematis, Winter-flowering. By R. Rambault (*Le Jard.* vol. xxii. No. 502, p. 29; January 20, 1908; 1 fig.).—A plea for the winter-flowering species of Clematis, *C. cirrhosa* and *C. calycina* Ait. (*C. balearica* Rick.), which are too seldom seen, though both are perfectly hardy in France and the south of England. They are ornamental creepers, with shiny evergreen leaves and pendent bell-shaped flowers, creamy-white, and flowering from November to January in the case of *C. cirrhosa*; yellowish-white, with red spots inside, and flowering from January in that of *C. calycina*. It is well to give them the protection of a west wall, since frost is apt to cut the flowers if they expand before the rime has melted. Light soil suits them best. They flower on new wood, and should therefore be pruned in April or May as soon as they have done blooming. They may be propagated by cuttings.—*I. A. W.*

Clerodendron oreadam. By S. Moore (*Jour. Bot.* 531, pp. 93-94; 3/1907).—Description of a new species, collected by Dr. Bagshawe in the forest near Mpanga, Toro, with notes on allied species.—*G. S. B.*

Codonopsis convolvulacea. By D. Prain (*Bot. Mag.* tab. 8178).—Nat. ord. *Campanulaceae*, tribe *Campanuleae*. Eastern Asia. Perennial twining shrub; leaves $\frac{3}{4}$ -2 inches long; corolla campanulate, 2 inches diameter, blue.—*G. H.*

Coffea eugenioides. By S. le M. Moore (*Jour. Bot.* 530, p. 43; 2/1907).—Description of a new species, near to *C. brachyphylla*, from forest near Mpanga, Toro, collected by Dr. A. G. Bagshawe.—*G. S. B.*

Coleus. By S. Moore (*Jour. Bot.* 531, pp. 95-97; 3/1907).—Descriptions of three new species of the *Solenostemonoides* section, *C. toroensis*, collected by Dr. Bagshawe in the forest near Durro River, Toro, with yellow flowers, and allied to *C. decurrens*; *C. polyanthus*,

with violet flowers, allied to *C. nyikensis*; and *C. matopensis*, also with violet flowers, allied to *C. aconitiflorus*, but with smaller flowers, the two last-named being collected by Mr. F. Eyles in the Matopo Hills.

G. S. B.

Coniferae and Gnetaceae of Central Europe, The. Edited by O. Kirchner, E. Loew, and C. Schroter; Stuttgart, E. Ulmer (*Lebens. d. Blütenpfl.*).—This work has been appearing in parts since 1906, and is intended to include all groups of flowering plants; the parts are about fifty pages each. Vol. i., here dealt with, extends to about 350 pages, and is amply illustrated. The editors, assisted by a staff of specialists, aim at summarising all that is known about prominent European plants, and the thoroughness with which this is done makes the work indispensable for reference, although as yet comparatively few British botanists know of it. The main feature is the ecological nature of the information, vegetative organs receiving more attention than floristic characters; but the latter aspect is by no means neglected.

The introductory section consists of a series of condensed tabulated summaries—what may be called a bird's-eye view of the ecological features of plants. The first is, an attempt to group adaptation-forms under various categories. The second is a grouping of plants according to their mode of nutrition, substratum, duration of life, phenology, and other features. Another section on special ecological features deals with seedlings and germination, juvenile forms, and the many adaptation-forms of adult plants. In short, one has presented in a condensed form all the recent developments of the ecological side of botany. The number of new terms is almost bewildering; but it must be admitted that for many no previous equivalent existed, and acquaintance with them is facilitated by an explanatory glossary.

The descriptive part of the work extends to about 300 pages well illustrated. The following are the plants dealt with: *Taxus baccata*, *Abies alba*, *Picea excelsa*, *Larix decidua*, *Pinus sylvestris*, *P. montana*, *P. austriaca*, *P. Pinaster*, *P. Cembra*, *P. Strobus*, *Cupressus sempervirens*, *Juniperus communis*, *J. Oxycedrus*, *J. phoenicea*, *J. Sabina*, *Ephedra distachya*, *E. major*. The method of this part of the work will probably be best grasped if we select one species as an example of all the others: e.g., Scots pine (*P. sylvestris*). The first part deals with general and local distribution, and the climate and soil requirements; here there is much of interest from the economic and geographical points of view. The plant association is next considered, and there is given a list of plants typical of the undergrowth of pine forests. The seed, its commercial germinative power, and the course of germination next come under consideration; likewise the requirements of the tree as regards light. Growth-forms are discussed, and the information on needle arrangement will be found most valuable, since it touches on a subject of much difficulty even to the expert. The forester will find a useful summary on the timber, its rate of growth and variation in different districts. The flower follows and leads on to the seed. Each species is dealt with in the same thorough manner, and the literature on the subject is extensively cited. The whole treatment is unique and much in advance of anything yet published.—W. G. S.

Coniferous Seedlings, Damping off. By Perley Spaulding (*U.S.A. Dep. Agr., Circ.* 4 ; April, 1908).—Relates the experience derived from experiments on the treatment of damping off in coniferous seedlings. The powders used were sulphur, dry Bordeaux mixture, and copper sulphate and lime. The solutions were potassium sulphide, potassium permanganate, formalin, and sulphuric acid. The results hitherto obtained are not regarded as conclusive, but it is hoped that the present season's work will develop results from which definite conclusions may be drawn.—*M. C. C.*

Crataegus in North America. By C. S. Sargent (*Jour. Bot.* 586, pp. 289-292 ; 8/1907).—Five hundred species have been described in the last eight years, which fall into twenty natural groups ; but the species, if species they are, are fertile, and do not vary or hybridise. Some of the groups are confined to distinct geographical areas. Herbarium specimens are unsatisfactory, as flower and fruit should be got from the same tree, with notes on the colour of the anthers.—*G. S. B.*

Crinum Vassei. By D. Bois (*Rev. Hort.* March 16, 1908, pp. 182-8 ; 1 plate, coloured).—Native of Portuguese West Africa, at 750 metres altitude. The plate illustrates a very handsome plant bearing fine white flowers, with long slender petals, striped centrally with bright red. The flowers are about 8 inches long and the inflorescence about 18 inches across.—*C. T. D.*

Croton. By S. Moore (*Jour. Bot.* 540, p. 406 ; 11/1907).—*C. sparsiflorus*, a native of South America, which has turned up at Calcutta, is the original redescribed as *C. nivifer* and as *C. rivinoides*.

G. S. B.

Crown Gall, Cross Inoculation. By Geo. G. Hedcock (*U.S.A. Dep. Agr., Bull.* 131, part 3 ; March 1908).—The results of five years' experiments show that the soft galls from almond, apricot, blackberry, cherry, peach, plum, prune, and raspberry have been transferred easily to seedlings of almond, apricot, peach, and raspberry ; less readily to blackberry, cherry, plum, and pear, and with difficulty to apple, chestnut, walnut, and rose.

The soft galls of apple, chestnut, walnut, rose, and pear have not been transferred readily to any of the plants mentioned. Evidence has been obtained of a wide range of susceptibility in different varieties of the same plant.

The results of these experiments show that the opportunity presented for breeding and selecting races of plants resistant to this common and destructive disease is excellent.—*M. C. C.*

Cypripedium debile. By R. A. Rolfe (*Bot. Mag.* tab. 8183).—*Nat. ord. Orchidaceae*, tribe *Cypripediaceae*. China and Japan. Herb 4-6 inches high ; leaves broadly ovate ; scapes $\frac{3}{4}$ -1 $\frac{3}{4}$ inches long ; flowers small, pale green ; sepals and petals with dark purple blotches at base ; lip $\frac{1}{2}$ inch long, white.—*G. H.*

Cyprus, Flora of. By H. S. Thompson (*Jour. Bot.* 524, pp. 270-278; 525, pp. 304-309; 526, pp. 332-341; 8-10/1906).—A list of species in the Kew herbarium, or previously recorded, with an account of the topography, climate, physical features, and botanical history of the island.—*G. S. B.*

Dioscorea Batatas (*Jour. Soc. Nat. Hort. Fr.* 4th series, vol. ix.; December 1907, p. 728).—The description of a new variety of the Chinese yam (*Dioscorea Batatas*), which, while preserving all the good qualities of the type and weighing quite as much, is only half its length.—*M. L. H.*

Donax and Schumannianthus. By R. A. Rolfe (*Jour. Bot.* 534, pp. 242-244; 6/1907).—A revision of the synonymy of these Marantaceous genera.—*G. S. B.*

Elaeagnus Futcheri. By S. T. Dunn (*Jour. Bot.* 540, p. 404; 11/1907).—Description of a new species from Cape D'Aguillar, Hong Kong, collected by W. J. Futchers.—*G. S. B.*

Etherisation : Its Use in Forcing. By H. Weidlich (*Gartenflora*, No. 5; March 1908).—Herr Weidlich gives the results of his three years' experience of the value of etherisation to the forcer of early flowering shrubs, and of the methods which he has employed with success.

W. R. D.

Feldspathic Rocks as Fertilisers, The Use of. By A. S. Cushman (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 104; May 1907).—Finely ground feldspathic rocks may under certain circumstances provide a source from which plants may obtain potash. Although ground feldspar is not an efficient substitute, under all circumstances, for potash salts, yet with certain crops it is thought that it may prove useful if ground sufficiently fine. The whole question is, as yet, however, unsettled, and this bulletin merely gives a summary of the evidence for and against its use as a fertiliser, and emphasizes the fact that it would be extremely unwise for anyone to attempt to use ground rock except on an experimental scale that would not entail great financial loss.—*F. J. C.*

Forcing by Direct Heat. By Dr. Mehner (*Le Jard.* vol. xxii. No. 501, p. 12; January 5, 1908).—The author proposes to replace the cumbrous frames and greenhouses, now used in forcing early flowers and vegetables, by a system of pipes to heat the soil directly. Heat without light would be ineffectual. He therefore waits till March, when the soil temperature is usually 1°-5° C., or 6° C. at a depth of 50 cm. Superheated steam is then driven through earthen pipes, between each of which there is space enough to let hot air and steam escape into the soil, until the temperature is raised to that of June (15°-19° C.). Asparagus is usually cut in May at a subsoil temperature of 11° C. By heating the soil as described from 1°-11° C. in March, it becomes possible to obtain an early crop, the value of which far exceeds the cost of fuel and installation.—*F. A. W.*

Fritillaria flavida. By A. B. Rendle (*Jour. Bot.* 518, p. 45; 2/1906).—Description of a new species from Tibet, near to the Himalayan *F. Stracheyi*, from which it differs in its yellow flowers with rather narrower petals.—G. S. B.

Fruit Diseases, Investigations on. By H. J. Eustace (*U.S.A. Exp. Stn. Geneva, N.Y., Bull.* 297, Feb. 1908; 7 plates).—Apples artificially inoculated with decay-producing fungi were placed in commercial cold storage, temperature 32° F., and held there for two months or more. Of the several species used *Penicillium glaucum* (blue mould) was the only one that developed and caused decay. Upon removal to a warmer temperature all the species of fungi developed and caused decay.

Decay was not entirely prevented in inoculated apples held at a temperature of 35°–56°, and developed vigorously at a temperature of 48°–69°.

Peaches inoculated with *Sclerotinia fructigena* (brown rot), the most common and destructive decay of peaches, developed a small amount of decay in two weeks at a temperature of 80° F.

Spores of *Penicillium glaucum* (blue mould) can be destroyed by fumigation with sulphur, but when these fumes come in contact with ripe apples the commercial value of the fruit is lessened.

Spraying immature apples with Bordeaux mixture did not check the development of spots of *Venturia inaequalis* (scab) that had started previous to the application of the Bordeaux mixture.—M. C. C.

Fungicide, Self-boiled Lime-sulphur Mixture as a. By W. M. Scott (*U.S.A. Dep. Agr., Circ.* 1; April 1908; 2 figs.).—The toxic action of Bordeaux mixture on peach foliage, rendering it practically useless for the control of peach diseases in the growing season, led the writer to investigate other possible fungicides that might prove less caustic.

During 1907 self-boiled lime-sulphur mixtures in various proportions and strengths were tested on both the apple and the peach.

The mixture which gave the most promising results was composed of ten pounds of sulphur (flowers or flour) and fifteen pounds of fresh stone lime to fifty gallons of water, and may be prepared as follows:

Place the lime in a fifty-gallon barrel and pour two or three gallons of boiling water over it. Immediately add the sulphur and another three gallons of hot water. The heat from the slaking lime will boil the mixture violently for several minutes. Some stirring is necessary, to prevent burning, and more water should be added if the mass gets too thick to stir, but the cooking is more effectual when the minimum quantity of water is used, usually from six to eight gallons being required. A piece of old carpet or gunny sack thrown over the top of the barrel helps to keep in the heat. The boiling will continue from twenty to thirty minutes, depending upon the quality of the lime. When the boiling ceases dilute with cold water to make fifty gallons, stir thoroughly, and strain through a sieve of about twenty meshes to the inch, in order to take out coarse particles of lime, but all the sulphur should be carefully worked through.

It seems likely that a lime-sulphur mixture, either self-boiled or unboiled, will prove to be a safe and valuable fungicide for use on fruit trees and other plants during the growing season.—*M. C. C.*

Gardenia. By S. Moore (*Jour. Bot.* 585, pp. 264-265; 7/1907).—Descriptions of two new species, *G. lanciloba*, from Toro, Semliki Forest, near Buranga, collected by Dr. Bagshawe, with primrose-coloured flowers; and *G. pomodora*, collected by the same collector in Kibale Forest, Toro, at 4,500 feet, and by E. Brown at Entebbe. The latter has fleshy flowers, with the odour of over-ripe apples, faint yellow with red streaks, or purple spotted with yellow, and is allied to *G. zanguibarica*.—*G. S. B.*

Germination of Poplars. By F. H. Woolward (*Jour. Bot.* 540, pp. 417-419, tab. 487; 12/1907).—A brief comparative account of the germination of *P. canescens*, *P. canadensis*, *P. nigra*, and *P. marilandica*.
G. S. B.

Germination, Rapid. By J. Paquet (*Le Jard.* No. 503; February 5, 1908).—Seeds of radishes and other Cruciferae can be made to germinate in less than eight minutes by plunging them into hot water and then laying them between rags soaked in boiling water in a small flower-pot nearly filled with moist earth. Cover with an inverted flower-pot, a little smaller, and set the two on a warm stove, but not too near the fire. Keep the rags moist by adding a little water.

To this "Hortulus" adds a note on chemical methods of accelerating germination, by merely treating the seed with some chemical such as weak chlorine water (two drops to 60 cc. of water). The seeds if placed in the sun will germinate completely in six hours. It is, however, necessary to watch the process, and to remove the seeds from the chlorine water and wash them, directly the radicle appears. This acceleration is simply due to the action of nascent oxygen liberated on the decomposition of the water by the chlorine in the presence of light. Hard seeds would need to be soaked in water for some hours before steeping them in the chlorine solution. Alkaline substances, e.g., ammonia, potash, soda, in highly dilute solution, also aid the process of germination. Another curious method, proposed by M. Ragoneau in 1885, consists in watering the seeds with a 50/100 solution of formic acid at a temperature of 25°-30° C. This dissolves the integuments, and seeds which normally require eight or ten days will germinate in as many hours. This has been utilised by the fakirs in India. They select a young and tender bean and place it in very moist earth from an ant-heap. With the aid of heat the bean sprouts in a "miraculous" manner.—*F. A. W.*

Ginger, Cultivation and Preparation of Jamaica. By H. J. Miller (*Journ. Imp. Dep. Agri. W.I.* No. 8, 1907).—A brief account of the history of ginger cultivation in Jamaica and the preparation of ginger for the market.—*M. C. C.*

Gooseberry Mildew. By J. Barsacq (*Le Jard.* No. 506, p. 87; March 20, 1908; 2 figs.).—M. Barsacq gives an historical sketch of the

disease, with figures of the American mildew (*Sphaerotheca mors-uvae*) and the European mildew (*Microsphaera Grossulariae*), the former being infinitely more deadly. There seems a danger of its spreading to currants also. Of the various remedies proposed liver of sulphur appears to be the most efficacious. The plants should be frequently sprayed with a weak solution as a preventive. Where the fungus is already established it is advisable to employ naphthol- β . It is necessary to add soap to dissolve this chemical in water. It can be mixed in a bucket and afterwards diluted for use in the proportions of 1 kilo. (2 lb.) to 250–300 litres (50–60 gallons) of water.—*F. A. W.*

Gordonia anomala. By J. Britten (*Jour. Bot.* 587, p. 318; 9/1907).—This is the correct name of *Camellia axillaris* of *Bot. Reg.* 349, and *Bot. Mag.* 2047.—*G. S. B.*

Grafting: Influence of Stock on Scion. By M. P. Passy (*Jour. Soc. Nat. Hort. Fr.* 4th series, vol. ix.; February 1908, p. 106).—The author claims to have proved by experiment that the stock has no influence whatever on the character of the fruit borne by the scion, even in the case of double grafting.—*M. L. H.*

Grapes, Bag Method of Protecting. By G. Rivière and G. Bailhache (*Jour. Soc. Nat. Hort. Fr.* 4th series, vol. ix.; February 1908, p. 182).—Analyses showing the sugar content of grapes taken from bunches grown under the protection of paper bags, and from some not so covered, showing the great advantage of the first of these methods.

M. L. H.

Gypsophila graeca. By J. Britten (*Jour. Bot.* 526, p. 345; 10/1906).—A reclamation of this name for *G. hirsuta*, according to the Vienna rules.—*G. S. B.*

Herbertia amatorum. By T. F. Chip (*Bot. Mag.* tab. 8175).—Nat. ord. *Iridaceae*, tribe *Moraceae*. South America. Leaves 7–8 inches long; perianth 2 inches diameter, outer segments obcuneate, dark violet; claw with white obcordate spot. *G. H.*

Hybrids among British Phanerogams. By E. F. Linton (*Jour. Bot.* 535, pp. 268–276, and 536, pp. 296–304; 7 and 8/1907).—A catalogue raisonné of all recorded cases.—*G. S. B.*

Hybrids, Pollen of. By E. S. Gregory (*Jour. Bot.* 538, pp. 377–378; 10/1907). In violets hybrids often produce normal sound pollen.
G. S. B.

Ipomopsis elegans. By E. Laumonnier (*Rev. Hort.* March 1, 1908, p. 109; 1 plate, coloured).—A North American biennial. Spikes of brilliant scarlet flowers. Cultural directions. Requires stopping to produce laterals. Recommended for cut flowers.—*C. T. D.*

Kaempferia Kirkii, var. elatior. By O. Stapf (*Bot. Mag.* tab. 8188).—Nat. ord. *Zingiberaceae*, tribe *Hedychieae*. Rhodesia. Perennial herb, 12–18 inches high; leaves acuminate, 12 inches by 2 3 inches;

staminodes and labellum bright rose colour, latter $1\frac{3}{4}$ inches long and 3 inches broad, with a yellow blotch.—*G. H.*

Larix Griffithii. By O. Stapf (*Bot. Mag.* tab. 8181).—Nat. ord. *Coniferae*, tribe *Abietinae*. Sikkim and Bhutan. Tree 20-65 feet high; leaves fascicled, 30-50; cone cylindric, 3 inches long, purplish-brown; scales truncate, $\frac{1}{2}$ inch long and broad.—*G. H.*

Limonium, Notes on. By C. E. Salmon (*Jour. Bot.* 529, pp. 24-25; 1/1907; and 540, pp. 428-432; 12/1907).—Continued from *Jour. Bot.* 505, p. 5; 1/1905; and dealing with *L. binervosum* and its vars. *procerum* and *humile*, and with *L. bellidifolium*.—*G. S. B.*

Magnolias, Deciduous. By E. Raignault (*Le Jard.* No. 54, p. 58; February 20; 5 figs.).—A description of the various species and varieties of deciduous Magnolias, with their several characteristics, the Asiatic species dealt with being *M. conspicua*, *obovata* or *purpurea*, *stellata*, *Watsonii*, and *Campbellii*; the American *M. macrophylla*, *Umbrella*, *acuminata*, *cordata*, *glauca*, and *Fraseri*. There is a further note by P. Hariot on *M. hypoleuca* from China and Japan.—*F. A. W.*

Nitrogenous Manure, The Application of. By Dr. R. Otto (*Gartenflora*, No. 5; 1908).—Lettuces and kohlrabi were grown on four plots: (1) without nitrogenous manure; (2) with a dressing of sulphate of ammonia (containing 20 per cent. of nitrogen) at the rate of $1\frac{3}{4}$ oz. per square yard; (3) with a dressing of twice this amount of sulphate of ammonia; (4) with a dressing of sulphate of ammonia at the rate of $3\frac{1}{2}$ oz. per square yard and copious moisture.

In the case of the lettuces the best results were obtained from (3), the other plots being placed in the order (2), (4), (1), with but slight difference between the produce of plots (4) and (1).

The kohlrabi roots did best in (2), the order of the other plots being (1), (3), (4), while as regards leaf growth the order was (2), (4), (1), (3).

In both cases the most notable result is the fact that the presence of copious moisture in conjunction with heavy dressings of nitrogenous manure has no beneficial effect on these vegetables, but rather the reverse.

W. R. D.

Olearia ciliata. By W. Watson (*Bot. Mag.* tab. 8191).—Nat. ord. *Compositae*, tribe *Asteroideae*. Australia and Tasmania. Shrub 1-2 feet high; leaves crowded, recurved, $\frac{1}{2}$ 1 inch long, about $\frac{1}{2}$ inch broad; heads 1 inch diameter, lilac.—*G. H.*

Olive Tubercle: Recent Studies. By Erwin F. Smith (*U.S.A. Dep. Agr., Bull.* 131; May 1908).—In recent years the olive orchards of California have suffered from swellings on the branches, known as olive tubercle, and attributable to bacteria. This memoir gives its history and records previous researches, with the results of more recent studies, and at length, after investigating previous nomenclature, determines *Bacterium Savastanoi* to be the future designation of the organism of the olive tubercle.—*M. C. C.*

Onosma tenuiflorum. By J. Britten (*Jour. Bot.* 526, p. 846; 10/1906).—A reclamation of this name, dating from 1797, for *O. rupestre* of 1808.—*G. S. B.*

Ophrys muscifera var. **virescens.** By R. A. Rolfe (*Jour. Bot.* 585, p. 282; 7/1907).—A note on an exceedingly rare variety of the Fly Orchis from Wye, Kent.—*G. S. B.*

Oranges: Decay whilst in Transit from California. By G. Harold Powell and others (*U.S.A. Dep. Agr., Bull.* 123; March 1908; 9 plates).—This bulletin gives the result of inquiry into the decay of oranges during transit from California to the East, the loss being estimated at from 500,000 dollars to 1,500,000 dollars annually, the output latterly being from 25,000 to 32,000 cartloads, *i.e.*, from 6,000,000 to 11,000,000 boxes, having a gross value of from 25 to 32 million dollars annually. The common blue mould, *Penicillium glaucum*, was always found to be associated with decaying oranges. This fungus has always been considered as saprophytic, but the inoculation of sound oranges with the spores of this species has, without exception, resulted in the characteristic decay. Investigation has shown that the decay has followed through mechanical abrasions of the skin. Most of these injuries are invisible to the inexperienced eye. The most common forms of injury were caused by the clippers in cutting the fruit from the tree. If the fruit is packed promptly after picking, and is shipped at once in a cool temperature, the decay may not develop in transit. The temperature changes slowly in transit. In a car in which the fruit is cooled to 40° F. or lower before shipment the temperature remains nearly constant, if the car is re-iced regularly in transit.—*M. C. C.*

Oxalis, Yellow-flowered Species Common to Europe and America. By B. L. Robinson (*Jour. Bot.* 527, pp. 386-391; 11/1906).—A critical comparison of three species: 1. *O. corniculata*, the commonest species of Continental Europe, the British Isles, and the eastern United States, the *O. stricta* of most English and Continental writers, known as a weed and of doubtful origin; 2. *O. stricta*, indigenous in North America, but apparently introduced in Devonshire, Jersey, and France, the *O. corniculata* of most English writers, and *O. Navieri* of France; and 3. *O. repens*, tropical and sub-tropical in a wild state, and as a weed in greenhouses, the *O. corniculata* of the Continent.—*G. S. B.*

Paeonia Mlokosewitschii. By W. Watson (*Bot. Mag.* tab. 8173).—*Nat. ord. Ranunculaceae*, tribe *Paeoniaceae*. Caucasus. Leaves biternate, 3-4 inches long; flowers 4-5 inches diameter; petals eight, roundish, sulphur-yellow.—*G. H.*

Paracaryum racemosum. By J. Britten (*Jour. Bot.* 526, p. 848; 10/1906).—A reclamation of this name, according to the Vienna rules, for *Cynoglossum angustifolium*.—*G. S. B.*

Peach, A new, 'Jessie Kerr.' By Charles Baltet (*Rev. Hort.* March 1, 1908, p. 101).—This American peach is highly recommended

as a vigorous and productive one, the fruits being larger than 'Amsden,' of fine colour, and somewhat earlier. Stone entirely free. Has done well in the open in France.—*C. T. D.*

Petunias, Double-fringed, 'Perfection Rose.' By M. Houssy (*Le Jard.* vol. xxii. No. 501, p. 12; January 5, 1908).—New variety with clear carmine flowers, sometimes edged with white. Highly recommended for border masses and pot culture.—*F. A. W.*

Phaseolus. By J. Britten (*Jour. Bot.* 526, pp. 343-4; 10/1906).—A reclamation of the name *P. trilobatus* for the species known as *Dolichos trilobatus* or *Phaseolus trilobus*.—*G. S. B.*

Philodendron Corsinianum. By W. Watson (*Bot. Mag.* tab. 8172).—Nat. ord. *Aracae*, tribe *Philodendreae*. Garden hybrid raised by Messrs. Makoy, of Liège. Climbing plant; leaf-blade, $1\frac{1}{2}$ – $2\frac{1}{2}$ feet long, 11–18 inches broad, cordate ovate, deep green above, dull purple below; spathe 3 inches long, purple-crimson, with spots of crimson-brown and white dots; spadix 6– $6\frac{1}{2}$ inches long, creamy-white.—*G. H.*

Phosphates, Action of Water and Aqueous Solutions upon. By F. K. Cameron and J. M. Bell (*U.S.A. Dep. Agr., Bur. of Soils, Bull.* 41; June 1907; 5 figs.).—An exhaustive account of some of the changes taking place in the phosphates in the soil. The conclusions arrived at are that soil phosphates are decomposed or hydrolysed by water with the formation of other phosphates containing relatively more of the base. Neutral salts in solution usually increase the amount of phosphoric acid and of lime going into solution from a lime phosphate. Lime salts and alkaline solutions decrease the amount of both in solution, and acid solutions increase it. Neutral salts have little action on phosphates of iron and alumina, while salts which hydrolyse with the formation of acid or alkaline solutions increase the amount of phosphoric acid yielded to the solution by the phosphates of iron and alumina. Since all soils contain far more basic matter than is sufficient to combine with the phosphoric acid, the least soluble phosphates are the ones which will be formed and will control the concentration of the soil moisture. The concentration of the phosphoric acid in the soil moisture will not be materially affected by the addition of phosphatic fertilizers to the soil, and will vary but little for different soils and with the total amount of phosphoric acid in soils. The changes in both solution and solid which take place during the progress of leaching superphosphates are also described.—*F. J. C.*

Polygonum Aubertii. By J. Baum (*Die Gart.* No. 24, p. 281; March 14, 1908).—A new species from Tibet; resembles *Polygonum Baldschuanicum*, but is even more rapid-growing, and has darker green foliage and pure white flowers.—*G. R.*

Polystichum Braunii in England. (*Jour. Bot.* 540, p. 451; 12/1907).—This fern, collected by the Rev. W. H. Painter in Leigh Woods, Bristol, as *Aspidium angulare*, has been identified by Dr. Kümmerle, of Budapest. An English description is here given.—*G. S. B.*

Porquerolles, Flora of. By H. S. Thompson (*Jour. Bot.* 528, pp. 407-410; 12/1906).—A description of the interesting flora of a small island off Hyères. (*G. S. B.*)

Potentilla concolor. By R. A. Rolfe (*Bot. Mag.* tab. 8180).—Nat. ord. *Rosaceae*, tribe *Potentilleae*. China. Perennial herb, over 1 foot high; upper leaves trifoliate; flowers $1\frac{1}{2}$ inches diameter; petals deep yellow.—*G. H.*

Prunus Fordiana and P. marginata. By S. T. Dunn (*Jour. Bot.* 540, pp. 402-403; 11/1907).—Descriptions of two allied species from Kwantung, near to *P. punctata*.—*G. S. B.*

Pseudolarix Fortunei. By W. B. Hemsley (*Bot. Mag.* tab. 8176).—Nat. ord. *Coniferae*, tribe *Abietineae*. China. Tree resembling larch, 120-130 feet high; leaves deciduous; female catkins globose; cone ovoid-oblong, $1\frac{3}{4}$ -2 inches long.—*G. H.*

Pyrus Aria, var. majestica. By W. J. Bean (*Bot. Mag.* tab. 8184).—Nat. ord. *Rosaceae*, tribe *Pomeae*. Garden origin? Tree 40 feet high; leaves 8-7 inches long; flowers in corymbs, 3-4 inches across; petals dull creamy-white. Fruit in loose corymbs, globose, $\frac{1}{2}$ inch diameter, bright red.—*G. H.*

Pyrus Tschonoskii. By O. Stapf (*Bot. Mag.* tab. 8179).—Nat. ord. *Rosaceae*, tribe *Pomeae*. Japan. Tree 30-40 feet high; trunk 1 foot diameter; racemes umbellate; flowers upwards of 1 inch diameter, white. *G. H.*

Raspberry Pest (*Agrilus chrysoderes* var. *rubicola* Ab.). By J. Vercier (*Le Jard.* vol. xxii. No. 502, p. 28; January 20, 1908; 1 fig.).—The raspberry crop in America has long been devastated by *Agrilus ruficollis* Fab., and *A. chrysoderes* has now made its appearance as a pest of the crop in Côte d'Or, whence come the best raspberries of France. It is a minute bronze beetle found on the leaves during the summer which deposits its ova on the twigs in July. The larvae burrow under the bark, making spiral galleries which intercept the flow of the sap, and the shoot withers from desiccation, or snaps when pruned or exposed to gusts of wind. The larvae remain in the bark throughout the autumn and winter, penetrating farther in May, and emerging in June as a beetle. The pests are subject to the attacks of Hymenopterous parasites. The best cure for the *Agrilus* scourge is to burn all doubtful or infected wood after the autumn pruning and again early in May, before the insects come out.—*F. A. W.*

Rehmannia angulata. By W. B. Hemsley (*Bot. Mag.* tab. 8177).—Nat. ord. *Scrophulariaceae*, tribe *Digitalieae*. China. Biennial or perennial; stems 4-6 feet long; leaves ovate-oblong; corolla 3-4 inches long, pink with a yellow throat.—*G. H.*

Rheum inopinatum. By D. Prain (*Bot. Mag.* t. 8190).—Nat. ord. *Polygonaceae*, tribe *Rumiceae*. Tibet. Perennial herb; leaves sub-

bullate, 3-6 inches long, 2-5 inches wide; inflorescence paniculate, nutlets orbicular, bright red, $\frac{1}{2}$ inch across.—*G. H.*

Ribes, Robsonia Section. By D. Bois (*Rev. Hort.* Jan. 16, 1908, pp. 29-32; 9 figs.).—A very interesting article on these flowering shrubs, embracing a review of monograph, *Monographie des Enseilliers*, by Ed. de Lanczewski, Geneva.—*C. T. D.*

Rosa Willmottiae. By W. B. Hemsley (*Bot. Mag.* tab. 8186).—Nat. ord. *Rosaceae*, tribe *Roseae*. China. Shrub densely branched, 5-10 feet high, prickles in pairs; flowers rose-purple, $1-1\frac{1}{4}$ inches diameter.—*G. H.*

Rusts, Heteroecious, of Connecticut, having a Peridermium for their Aecidial Stage. By G. P. Clinton, Sc.D. (*U.S.A. Agr. Exp. Stn. Connecticut, Report*, 1907; 5 plates).—After a description of the general character of heteroecious rusts, this report proceeds to the discussion of Connecticut species, of which thirteen are dealt with, in addition to eight not yet known in the State.—*M. C. C.*

Sarracenia, Observations on. By J. M. Macfarlane (*Jour. Bot.* 529, pp. 1-7; 1/1907).—A history of the generic name, dedicated to Dr. D. Sarrasin, of Quebec, and of *S. Catesbaei*, *S. Drummondii*, and *S. minor*; but it appears (*Jour. Bot.* 531, pp. 117-118) that Sarrasin's name was Michel.—*G. S. B.*

Saxifraga Brunoniana. By W. Watson (*Bot. Mag.* tab. 8189).—Nat. ord. *Saxifragaceae*, tribe *Saxifrageae*. India. Perennial herb; stems with runners, slender, red; flowers golden-yellow.—*G. H.*

Saxifraga Grisebachii. By B. Othmer (*Die Gart.* No. 40, p. 469; July 4, 1908).—Discovered in 1902. A native of Albania and Macedonia at about 1,500 to 2,000 metres alt. The leaves form a perfectly symmetrical rosette, but the greater attraction lies in the bright purple bracts of the inflorescence.—*G. R.*

Sieve-Tubes of Angiosperms, The History of the. By A. W. Hill (*Ann. Bot.* vol. xxii. April 1908, pp. 245-285; 2 plates).—The latest communication by the author on the histology of the sieve-tube deals with *Vitis vinifera*, *Wistaria chinensis*, *Cucurbita Pepo*, *Tilia vulgaris*, *Viscum album*, *Phaseolus vulgaris*, and *P. multiflorus*.

In *Wistaria chinensis* and *Cucurbita Pepo* the pit-closing membranes are crossed by small groups of fine protoplasmic threads, whilst in *Vitis vinifera* there is apparently only one. Each pit is ultimately occupied by a single slime string which has arisen by ferment action from the original thread or threads. For details the original must be consulted.

The following explanation is given of the remarkable changes that take place in the phloem elements. In the sieve-tubes there is the need of the formation of definite holes for the translocation of material, and the connecting threads serve as useful paths along which to work in

order to produce tubes of sufficient diameter to enable an actual flow of slime to take place. Then since the large holes produced are likely to be a source of danger to the plant when translocation diminishes, the callus is utilised to regulate the bore of the tubes, and finally appears to put a stop to the translocatory processes altogether. With regard to the physiological function of the threads, it appears that they serve primarily for the transmission of stimuli, but that, owing to subsequent modifications in the special cases of the sieve-tubes, they become enlarged, and are able to serve secondarily for purposes of translocation.

A. D. C.

Silene bella. By J. Britten (*Jour. Bot.* 524, pp. 268 9; 8/1906).—A reclamation of E. D. Clarke's name for this species discovered by him in the Crimea and described in 1810.—G. S. B.

Silene elongata. By R. Paulson (*Jour. Bot.* 540, pp. 445-446; 12/1907).—A reprint of Bellardi's description of this species from the Alps and Dauphiné, which has been sunk in *S. acanthis*, but is considered by the author to be very distinct. *S. arscapa* and *S. bryoides* are closely allied.—G. S. B.

Sinningia Regina. By T. A. Sprague (*Bot. Mag.* tab. 8182).—Nat. ord. *Gesneriaceae*, tribe *Gesnerieae*. Brazil. Stem 6 inches long; leaves 4-8 inches long, 2½-6 inches broad; flowers pendulous; corolla pale violet with yellow band.—G. H.

Smut, Prevention of Sorghum and Kafir-Corn. By H. F. Roberts and G. F. Freeman (*U.S.A. Exp. Stn., Kansas, Bull.* 149; 7/07).—The authors tested a number of different strengths of formalin as a means of checking the attacks of the smut fungus. The seed was steeped in the solutions for two hours and then thoroughly dried before planting. The solution containing .5 per cent. of formalin was found to reduce the smut practically to zero.—F. J. C.

Sophora Japonica in the Royal Garden, Nassau. By R. Zeissig (*Die Gart.* No. 17, p. 200; January 25, 1908).—Attention is called to the many rare trees found in this somewhat neglected garden, overgrown by *Robinia Pseudacacia*. The collection was formed early in the last century by Baron von Stein, and many of the trees were introduced or raised from seeds by Alexander von Humboldt. Some of them, especially the beautiful late-flowering *Sophora japonica*, are 80 metres in height.—G. R.

Sorghum, The Smuts of. By Ed. M. Freeman and H. J. C. Umberger (*U.S.A. Dep. Agr., Circ.* 8; May 1908).—Two kinds of Sorghum smuts are enumerated, grain smut (*Sphacelotheca Sorghi*) and head smut (*S. Reiliana*). The recommendations are: To obtain seed free from smut. Keep farm free from smut by using own seed and machinery. Treat the seed with either formalin or hot water. Maintain a quarantine against any locality or farm where smut is known to exist. Maintain a quarantine against any handlers of machinery who allow their machinery to become contaminated with smut spores.—M. C. C.

Stock on Graft, Influence of (*Rev. Hort.* March 16, p. 123).—*Pinus excelsa* grafted on *P. Cembra* and also on *P. Strobus* in both cases assumed the exact habit of growth of the stocks used.—C. T. D.

Stocks. By M. Alin (*Le Jard.* No. 507, p. 104; April 5, 1908; 1 plate).—The different varieties of stock in cultivation are enumerated, with practical directions for their treatment.—F. A. W.

Sugar Beet, Curly Top, a Disease of. By C. O. Townsend (*U.S.A. Dep. Agr., Bull.* 122; April 1908; 11 plates).—Curly top is not identical with any disease of the beet previously known, and has not been reported from any country other than the United States. It does not appear to be produced by any one abnormal condition of soil or climate. It does not seem to be due to any parasite or any condition of the seed; it also attacks stock and garden beets, but does not seem to be communicated directly from beet to beet. It has not appeared to any serious extent two years in succession in the same locality. Growers need not hesitate to plant beets in a field, although the entire crop was destroyed in that field in the previous year.—M. C. C.

Tacsonia. By J. Britten (*Jour. Bot.* 537, p. 316; 9/1907).—*T. micradena* and *T. Purupuru* of Candolle are both identical with *T. pinnatistipula* of Jussieu. *T. pennipes* of M. J. Roemer is a variety of this species.—G. S. B.

Tea in Jamaica. By the Hon. H. E. Cox (*Journ. Imp. Dep. Agri. W.I.* No. 3, 1907).—A history of tea culture in Jamaica; conditions under which culture has taken place; summary of rainfall and average temperature, the mode of culture, and the preparation of the leaf.

M. C. C.

Telephium. By F. N. Williams (*Jour. Bot.* 525, pp. 289-304; 9/1906).—A learned discussion of the history of this genus, of which six species are recognised, from Dioscorides and Pliny downwards. The *Telephium* of Dioscorides, however, is *Cerithe major*.—G. S. B.

Timbers of Jamaica (*Journ. Imp. Dep. Agri. W.I.* No. 3, 1907).—This is a list of the timbers of Jamaica, with their local and botanical names, about 250 species, arranged under the following groups.

Timbers suitable for (1) cabinet work; (2) carriage and cart work; (3) coopering work; (4) fuel; (5) general inside work; (6) outside work; (7) house work and furniture; (8) mill work; (9) piles; (10) posts; (11) railway sleepers; (12) shingles; (13) turnery.—M. C. C.

Tobacco Root Rot, Field Treatment of. By Lyman J. Briggs (*U.S.A. Dep. Agr., Circ.* 7; May 1908).—The tobacco root rot is recognised as due to the action of a soil fungus (*Thielavia basicola*). It attacks the tobacco roots most severely when the soil has become alkaline. It is recommended that no lime be used on diseased fields, but that sulphate of potash or double manure salts be applied, and phosphoric acid in the form of acid phosphate, or dissolved bone, to correct the alkalinity of the soil. Diseased fields should be used for some other

crop for a year or more. No lime or alkaline form of fertiliser should be used until the roots of the tobacco are free from the disease.—*M. C. C.*

Variation and Mutilation. By M. L. Blaringhem (*Jour. Soc. Nat. Hort. Fr.* 4th series; vol. ix.; November 1907, p. 640).—M. Blaringhem claims to have produced variations as the result of partial mutilations of leaves and stems—the maize being the plant more particularly experimented on—and asserts that the structural changes produced are considerable, and may be transmitted to the progeny.—*M. L. H.*

Variation of *Oenothera*. By G. A. Boulenger (*Jour. Bot.* 538, pp. 353-363; 10/1907).—A description of a series of observations and measurements of the flowers of *Oc. biennis* from several localities, from which it is concluded that De Vries's *Oc. Lamarckiana* is merely the result of crossing various forms of the polymorphic *Oc. biennis* and affords no evidence of mutation.—*G. S. B.*

Viburnum utile. By W. B. Hemsley (*Bot. Mag.* tab. 8174).—Nat. ord. *Caprifoliaceae*, tribe *Sambuceae*. China. Shrub 4-5 feet high; leaves glabrous above, tomentose below; corolla white.—*G. H.*

Wallflowers, Mauve. By M. Houssy (*Le Jard.* vol. xxii. No. 501, p. 12; January 5, 1908).—Mm. Rivoire have produced a new variety of their celebrated Nice wallflower. The colour is described as "violet clair." This colour-designation is adopted by "Le Jardin" to keep the nomenclature in line with the list of colours published by the Chrysanthemum Society of France, which is there regarded as the official guide to horticultural colours. It would be a boon if some such system could be adopted in English horticulture.—*F. A. W.*

White Grubs (*Lachnosterna*), Life History, Habits, and Economic Relations of. By S. A. Forbes (*U.S.A. Exp. Stn., Illinois, Bull.* 116; 8/07).—This pamphlet gives a very complete account of the history, so far as it has been made out, of the grubs of several species of *Lachnosterna* known in Illinois. The British representatives of this group are well known as "Chafers," and the habits of our species, though differing in small details, are in the main quite similar to those reported here. In one experiment detailed, pigs were found to be a very efficient means of ridding a field of these pests. Unfortunately one of the intestinal parasites of pigs (*Echinorhynchus gigas*) passes one stage of its life in the chafer grubs, so that where either pigs or grubs are known to be infested the former cannot be used as a means of extirpating the latter.—*F. J. C.*

Widdringtonia in South Tropical Africa. By A. B. Rendle (*Jour. Bot.* 522, pp. 190-191, pl. 479 B; 6/1906).—A discussion of fresh material from Umtali, Rhodesia, where the trees are known as "cedars." Both the *Retinospora* and the *Cupressus* type of foliage occur, and the author figures leaf-sections, and concludes that *W. Mahoni* of Dr. Masters is specifically identical with *W. Whytei*.—*G. S. B.*

EXAMINATIONS IN HORTICULTURE.

I.—EXAMINATION OF EMPLOYÉES IN PUBLIC PARKS,

JANUARY 13, 1908.

THE Third Annual Examination by the Royal Horticultural Society of the employés in Public Parks and Gardens was held on January 13, 1908.

As previously, the examination was partly written and partly *vivâ voce*, occupying three hours and twenty minutes. It was held at the Society's Hall in Vincent Square, Westminster.

One hundred and thirteen candidates entered their names.

The results of the 1908 examination are highly gratifying to the examiners, and will be equally so to the Council of the Society, and to the London County Council, at whose suggestion this annual test for Public Parks Employés was started three years ago to stimulate intelligent observation and interest in public garden work. While it is to be expected that each year's results will show an improvement on the year preceding, the pronounced and rapid progress shown in the present examination was beyond our anticipation, and therefore the more encouraging to the examiners and the examined alike. Firstly, the *vivâ-voce* questions were, by most candidates, excellently answered, and high marks all round secured. This prepared the examiners for a similar excellence in the written section, but though this ideal was not quite realised, nevertheless the worked papers were decidedly in advance of former years. Still we are confident that an even higher standard of excellence should be attained; and, that future candidates may have some guidance in preparation, and may know how their predecessors have failed, the following criticisms are offered on this year's papers, which, with the remarks made by the examiners in 1906 and 1907, and issued with the report for those years, should prove helpful.

The examination exposed the difficulty surrounding the use of botanical names and terms, and these are necessary because the English names differ so essentially in one part of the country from those in common use in another, that, unless the botanical name is also given, we can never be sure what we are really talking about, or that we mean the selfsame plant. If candidates would every day look up, say, two or three names of plants with which they come in contact, and commit them to memory, it is astonishing how large an acquaintance may be made with botanical names in a short time, and how easy the acquirement of them soon becomes.

Again, candidates should take care to keep up their elementary school education. This most fail to do, as proved by the answers to questions 12, 13, and 14, which only involved some very simple arithmetic. The majority dared not attempt the questions, though they were very easy, and, of those who did, many failed in accurate working, and in question 14 omitted to divide an otherwise correctly figured answer by $3\frac{1}{2}$, con-

fusing the term "square yards" with "yards square," and so obtaining a numerical result far in excess of the correct one.

Again, marks were largely lost by the want of accurate comprehension of the questions. For instance, in question 11, the term "deciduous" was frequently ignored, and, instead of a list of only "deciduous" trees being given, evergreens were freely included. Perhaps this was still more marked in question 15, which asked, "What effect has frequent surface hoeing on trees and shrubs growing on the land?" . . . In answering this, much information was given as to the influence of surface hoeing *on the soil*, but the point of the question—the effect on the trees, &c.—was quite overlooked. It is so necessary in all examinations that the questions be closely scrutinised, and in reading a question the candidate should give sufficient time to really grasp its meaning, and to understand just what the examiners want to know.

Handwriting and accurate methods of expression still need attention; both mean practice, and, as regards the latter, one of the best preparations for an examination is to answer at home, in writing and without reference to books, questions set at previous or similar examinations, afterwards correcting them from books and looking up the points unknown.

By the replies to Question 9, we find that the majority of the employes are conversant with the names of trees and shrubs (both common and botanical) growing in the parks in which they are employed, but these very clearly indicate how restricted are the kinds of trees and shrubs at present grown in our public parks—every answer being practically a duplicate of the others. This seems to suggest a very desirable issue—viz., that more breadth of treatment should be introduced to our public gardens by increasing as far as possible the number of species and varieties of hardy, deciduous flowering trees and shrubs, of which we have at the present day so large a number to select from.

The examiners again desire to impress on the candidates the absolute necessity of observation as they pursue their daily work, and the application of thought as to the why and the wherefore of what they do and what they notice. A man can never be really fit for a high place in any calling in life unless he both thinks and observes. Rules are good, but only so long as they lead to the inquiry as to why in each case they should be followed, and what effect they are intended to produce. Seventeen candidates failed to obtain the requisite number of marks required for a "Pass." These unsuccessful candidates should not be disheartened by failure, but set themselves carefully to observe the things about them, and to think out for themselves the reasons of their different operations. Twelve months of this, coupled with inquiry from their superiors on points which seem difficult to fathom, will probably result in their success at the next or at some subsequent examination.

C. R. FIELDER,	} <i>Examiners.</i>
GEO. NICHOLSON,	
JOHN W. ODELL,	
OWEN THOMAS,	
EDWARD WHITE,	
W. WILKS,	

DIVISION A.

Class I.

1. Willard, Ernest James, 21 Forest Road, Leytonstone.
2. Poffley, A. T., 34 Grettton Houses, Bethnal Green.
3. Gorham, Henry, 44 Downhills Park Road, Tottenham.
4. Hentsch, Frederick, Rosary Lodge, Battersea Park.
5. Giles, Richard John, White Lodge, Victoria Park, S. Hackney.
6. Groom, C. G., 164 Denmark Hill, Ruskin Park, Camberwell.
7. { Smith, John G., 56 Paulet Road, Camberwell.
Parrott, C., Springhill Cottage, Upper Clapton.
9. Philp, F. J., Swain's Lane Lodge, Waterlow Park.
10. Hudson, James Henry, Surrey Mount, Westwood Park, Forest Hill.

Class II.

1. Hodge, William Albert, 18A Childeric Road, New Cross.
2. Western, Joseph, Island Gardens, Poplar.
3. Marshall, James, 24 Cook's Road, Kennington.
4. Miflin, Thomas, Prospect House, Peckham Rye Park.
5. Pogmore, C., 138 Crownfield Road, Leytonstone.
6. Harrowing, George, 1 Elfort Road, Highbury.
7. Marshall, Charles, West Lodge, Eltham.

Class III.

1. Gray, W. J., 24 New Church Road, Camberwell.
2. Scrase, Edward, 28 Wingfield Road, Stratford.
3. { MacConachie, Jos. Stainton, 2A Scawen Road, Deptford.
Parish, Henry G., 39 Canterbury Grove, West Norwood.
5. Scheel, Bernard, Park Cottage, Myatt's Fields, Camberwell.
6. Hurley, James, 141 Trundley's Road, Deptford.
7. Collop, Thomas, 2B Villa Street, Walworth.

DIVISION B.

Class I.

1. Blackburn, Arthur, 308 Kew Road, Kew.
2. Butcher, Percy George, 2 Luxford Street, Rotherhithe.
3. Troke, Andrew J., 7 Crewys Road, Child's Hill.
4. Hotten, Harry Walter, 22 Christie Road, South Hackney.
5. Cockram, Vincent, 14 Petworth Street, Battersea.
6. Williams, F., 27 Ruislip Street, Tooting.
7. Tribe, H., 6 Hedgley Street, Lee.
8. Porter, William Arthur, 35 Claude Road, Peckham.
9. Johns, William Henry, 5 Mortlake Terrace, Kew.
10. Palmer, William Stevens, 25 Mount Pleasant Road, Finsbury Park.
11. Black, R., 31 Bowerdean Street, Fulham.
12. Gallivan, John, 7 Novar Road, New Eltham.
13. Strong, Joseph, 11F Peabody's Buildings, Herne Hill.

14. Little, William B., 21 Haverfield Gardens, Kew.
15. Godfrey, William Henry, 29 Southfields Road, Wandsworth.
16. Mack, Frederick Cecil, 1 Brailsford Road, Brixton.

Class II.

1. Saunders, S. J., 23 Latchmere Road, Battersea.
2. { Schulze, Frederick W. O., 47 Romola Road, Herne Hill.
Joiner, George Thomas, 65 St. John's Road, South Tottenham.
Poate, Harry J., 22 Terront Road, Tottenham.
5. Dixon, Frederick Charles, The Limes, New Eltham.
6. Sheppard, Alfred Charles, 18 Glenwood Road, South Tottenham.
7. Richards, William J. J., 125 Rotherhithe New Road, Rotherhithe.
8. { Foote, W. J., 25 Crebor Street, East Dulwich.
Savage, William, 75 Kingswood Road, Brixton Hill.
10. White, Reginald A., 251 Sandycombe Road, Richmond.
11. Napier, William, 3 Cox's Cottages, Willing.
12. Richardson, John, 21 Alexandra Road, Richmond.
13. Savage, Bertie Arthur, 2 Bengworth Road, Camberwell.
14. { Parkin, William, 30 Claybrook Road, Hammersmith.
Musk, William, 130 Nevill Road, Stoke Newington.
Etterley, W. H., 21 Alexandra Road, Richmond.
Topper, J., 70 Etherley Road, West Green.
18. { Waldon, Walter, 172 Belgrave Road, Walthamstow.
Butler, H., 6 Brettenham Road, Walthamstow.
20. { Barrance, Francis, 3 Glen Cottages, Black Fen, Eltham.
Mitchell, Charles, 1 Diana Road, Walthamstow.
22. { Doctor, Jamshed M., 1 Place de l'Opéra, Paris.
Joyce, Robert J., 35 Gloucester Road, Kew.
24. { Kett, Robert, 87 Ashleigh Road, Mortlake.
Mayhew, Charles Watts, 308 Kew Road, Kew.
26. Locke, Frederick William, 8 Burrows Road, Kensal Rise.
27. Perrin, William, 25 Crebor Street, East Dulwich.
28. Lambert, Thomas, 4 Christie Road, South Hackney.
29. Firth, Thomas, 47 Rodwen Road, East Dulwich.
30. Edwards, J. H., 18 Heather Road, Lee.
31. Chipperfield, Alfred, 7 Culling Road, Rotherhithe.
32. { Close, Albert William, 35 Gloucester Road, Kew.
Weston, Robert James, 13 Gibbon Road, Nunhead.

Class III.

1. { Duncan, George, 31 Rowland Grove, Upper Sydenham.
Barrett, F. W., 10 Oaksford Avenue, Sydenham.
3. Bennett, Frank, 58 Avondale Road, West Green.
4. { Sirett, Frederick W. G., 3 West Bolton Gardens, Kensington.
Middlemiss, Thomas James, 51 Clement's Road, Bermondsey.
Featherstone, Ernest, 85 Antill Road, Bow.
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Coffey, Daniel James, 6 Halons Road, Eltham.

- 9. { Clacy, Charles S., 42 Townshend Terrace, Richmond.
- 9. { Gill, Robert, 804 Kew Road, Kew.
- 9. { Vyse, John William, 2 Coombe Road, Upper Sydenham.
- 12. { Ringe, James, 5A Winders Road, Battersea.
- 12. { Philpott, Ernest V., 59A Emu Road, Battersea.
- 12. { White, James S., 7 Bredon Road, Loughboro' Junction.
- 15. { Argent, Stephen, 3 Calvert Buildings, Wapping.
- 15. { Hurrell, Jim, 16 Jubilee Cottages, Eltham.
- 17. Duley, Edmund Arnold, 8 Bushwood Road, Kew.
- 18. Money, Edward George, 6 Oxford Road, Upper Norwood.
- 19. { Sinartt, Arthur E., 264 Sandycombe Road, Kew.
- 19. { Thompson, A. W., Golder's Hill Gardens, Hampstead.
- 21. Power, W., 210 Devonshire Street, Mile End.
- 22. Syms, Henry William, Copper Mill Gate House, Walthamstow.
- 23. Butler, Edwin Arthur, 169 Sydenham Road N., Croydon.

II.—GENERAL EXAMINATION,

APRIL 8, 1908.

THE Annual Examination in the Principles and Practice of Horticulture was held on April 8, 1908, when 151 candidates entered.

Twenty-seven candidates, or upwards of 18 per cent. of the whole number, were placed in the First Class.

Sixty-eight, or nearly 46 per cent., were placed in the Second Class.

Fifty-two, or upwards of 34 per cent., were placed in the Third Class.

The corresponding percentages in 1907 were: First Class 14; Second Class 40; and Third Class 46.

Of the questions on the Principles, by far the majority almost confined themselves to the first three questions on physiology. In the majority of cases these were answered very well. Other questions attempted were generally rather imperfectly treated.

Although none of the candidates obtained the highest number of marks obtainable in the Operations and Practice division, the answers were, generally speaking, better than in any previous year. The question referring to the uses of garden tools, &c., was most frequently and well answered; so also was that referring to the laying out of a new garden, and the preliminary work pertaining thereto.

Several candidates failed to obtain the number of marks commensurate with their abilities, owing to (*a*) their not timing their work, and by answering three questions only, instead of four; (*b*) one candidate answered six questions, another seven, and yet another eight, in one division, notwithstanding that it is clearly stated "Eight questions *only* may be answered, four from Division A, and four from Division B." Candidates should also be as concise as possible; the one that fills the greatest number of pages may be very far from gaining the highest number of marks, although it is only fair to say that nearly all the candidates have kept better to the details of the questions than in previous years.

GEORGE HENSLOW.
JAS. DOUGLAS.

CLASS LIST.

First Class.

1. Fyfe, A. B., Studley Horticultural College, Warwickshire.
2. Laurence, F. A. S., University College, Reading.
2. Perry, B. P., Royal Horticultural Society's Gardens, Wisley, Surrey.
3. Skelton, A., University College, Reading.
5. Turner, A., Essex County Laboratories, Chelmsford.
6. Christian, W. H., Byrkley Gardens, Burton-on-Trent.
7. Coventry, R., Wellesley Gardens, E. Wemyss, Fife.
8. Crisp, W., Upper Vobster, Coleford, near Bath.
9. Green, H., 5 Mortlake Terrace, Kew Gardens, W.
10. Longley, W., 1 Queen's Row, Walworth, S.E.
11. Read, A. G., 144 Charlton Lane, Old Charlton, S.E.

- Buckton, H., University College, Reading.
 Legge, C. D., School House, Great Tew, Enstone, Oxon.
 12. Ridley, J., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Seaton, H. E., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Turnbull, J. H., University College, Reading.
 Black, G. S., University College, Reading.
 17. Chatfield, L. M., Studley College, Warwickshire.
 de Pass, N. R., Studley College, Warwickshire.
 Snell, A. J., School House, Hamble, Southampton.
 Bonvonn, D. E., Trecewn, Letterston, S. Wales.
 Craze, S. J., Downton Castle Gardens, Ludlow.
 Gardner, R., Broomham, near Bedford.
 21. Grimwood, J. C., Alresford, Colchester.
 King, E. W., Studley College, Warwickshire.
 McKay, D. R., Slain's Castle Gardens, Port Erroll, N.B.
 Zabielska, R., Studley College, Warwickshire.

Second Class.

- (Athey, A. R., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Currall, A. H., Essex County Laboratories, Chelmsford.
 Gibbs, G. M., 21 High Bank Road, Winshill, Burton-on-Trent.
 Jourdain, P. F. C., University College, Reading.
 1. Larking, A., Baldersby Park Gardens, Thirsk.
 McCarrell, W., Deanston House Gardens, Perthshire.
 Riley, A. D., Studley College, Warwickshire.
 Wooderson, W., Lower Bourne, Farnham, Surrey.
 Yeoman, G. S., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Cannon, R. B., University College, Reading.
 Galloway, W. M., School of Gardening, Bredons Norton, Tewkesbury.
 Malden, A., Kingsley Green, Haslemere, Surrey.
 10. Mathias, B. A. A., Studley College, Warwickshire.
 Mathias, L. M., Studley College, Warwickshire.
 Townshend, C., University College, Reading.
 Wheeler, F., 74 Craven Avenue, Plymouth.
 Willard, E. J., 21 Forest Road, Leytonstone.
 Besant, E. S., 44 Darenth Road, Stamford Hill, N.
 Boothroyd, M., School of Gardening, Letheringsett, Norfolk.
 Hardy, B. G., School of Gardening, Bredons Norton, Tewkesbury.
 Haynes, B. M., University College, Reading.
 18. Meyer, S. B., University College, Reading.
 Phillips, N. A., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Spitta, E., University College, Reading.
 Turner, J. C., School House, Barnham, Thetford.
 Yandell, W., Longford Castle Gardens, Salisbury.
 Lawson, R., Woodside Cottage, Davidson's Mains, Midlothian.
 27. Murray, G., Kirkmichael Gardens, Maybole, Ayrshire.
 Philips, D. R., Ross Priory Lodge, Balloch, N.B.
 Wood, W. P., Oaklands Court Gardens, St. Peter's, Kent.

- Atkins, H. W., Cross Lane Nursery, Gravesend.
 Bransden, H. W., Essex County Laboratories, Chelmsford.
 81. Doran, T. H., Wraybury Council School, Bucks.
 Peake, J. J., Maison Dieu, Richmond, Yorks.
 Shepherd, F., Rose Cottage, Bramley, near Guildford.
 Blakey, J. W., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Duck, F., 138 Camellia Cottages, Lower Road, Abbey Wood.
 Eddie, H. M., Glenapp Castle Gardens, Ballantrae, N.B.
 Handa, T., Studley College, Warwickshire.
 86. Harris, J., Inverleith Public Park, Edinburgh.
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 Watson, W. E., University College, Reading.
 Wells, S. P., Essex County Laboratories, Chelmsford.
 Wheeler, F. G., 12 Kemble Road, Forest Hill, S.E.
 White, A., Oak Villa, Brough, East Yorks.
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 46. de Neergaard, I., Arlesey House, Arlesey, near Hitchin.
 Luxmoore, Miss, Ladies' A. and N. Club, Burlington Gardens, W.
 McFarlane, J., 304 Kew Road, Kew.
 Brickenden, A. V., School of Gardening, Bredons Norton, Tewkesbury.
 Brown, J. R., Royal Botanic Gardens, Edinburgh.
 Burnicle, J. W., 8 The Knoll, Sunderland.
 50. Eales, D. F., 3 Queen's Court, Hagley Road, Edgbaston, Birmingham.
 Edwards, S. S., The Cottage, Llanwern, Newport, Mon.
 Holah, D. O., University College, Reading.
 Morris, G. H., 30 Oxford Grove, near Whitworth Park, Manchester.
 57. Cook, J., Essex County Laboratories, Chelmsford.
 Hope, Wm., 182 Lewes Road, Brighton, Sussex.
 Mayes, E. J., Essex County Laboratories, Chelmsford.
 Monk, L. J., Essex County Laboratories, Chelmsford.
 59. Parsons, K. E. T., Horticultural College, Swanley.
 Pearce, H., Pinkney Park, Malmesbury, Wilts.
 Rope, P. M., Horticultural College, Swanley.
 Blundell, R., Essex County Laboratories, Chelmsford.
 Cracknell, C., Horticultural College, Swanley.
 64. Hague, O., Birtles, Chelford, Crewe, Cheshire.
 Oddy, E., 8 Oak Street, Crossflats, Bingley.
 Saunders, R., Horticultural College, Swanley.

Third Class.

- Boothroyd, G. P., School of Gardening, Letheringsett, Holt, Norfolk.
 Clarke, C. W., St. John's School, Caterham Valley, Surrey.
 Emmett, G. H., Mentmore Gardens, Leighton Buzzard.
 1. Jameson, E. A., Horticultural College, Swanley.
 Little, W. B., 21 Haverfield Gardens, Kew, W.
 Murray, J. M., Royal Botanic Gardens, Edinburgh.
 White, E. G., Bengurrah, Cahir, co. Tipperary.

8. { Barnes, A. G., 9 Mount Adon Park, E. Dulwich, S.E.
 Bell, C. M., Horticultural College, Swanley.
 Palmer, G., Horticultural College, Swanley.
 Rye, B., 28 Surrey Street, Norwich.
12. { Darrington, G. M., Essex County Laboratories, Chelmsford.
 Fishwick, V. C., Watergate Farm, Hockliffe, R.S.O., Beds.
 Jones, D. R., Horticultural College, Swanley.
 Manly, A. P., 79 Harborne Road, Edgbaston.
 Parkinson, G. H., National Schools, Broughton-in-Furness.
 Gould, A. R., Welbeck Abbey Gardens, Worksop.
17. { Jenkinson, M. A., Horticultural College, Swanley.
 Ledger, D., Essex County Laboratories, Chelmsford.
 Stuart, G. M., Royal Botanic Gardens, Edinburgh.
 Weber, C., School of Gardening, Corstorphine, Edinburgh.
22. { Ferard, B., Horticultural College, Swanley.
 Hollway, J. C., Horticultural College, Swanley.
 Lambourne, J., Chesterford Park Gardens, Saffron Walden.
25. { Bigge, F. W., Kingsbury Road, Tyburn, near Birmingham.
 Hadfield, J., Burn Hall Gardens, Durham.
 Hodgson, W., Burn Hall Gardens, Durham.
 Hutchins, F. T., Dover Place, Croesyceiliog, near Newport. Mon.
 Poole, W. C., 16 Slaty Road, Cloughton, Birkenhead.
30. { Feltham, E., 91 Sandycombe Road, Richmond, Surrey.
 Johnson, J., Shipley Hall Gardens, Derby.
 McPherson, N. G., Royal Botanic Gardens, Edinburgh.
 Pearson, W. J., School House, North Wold, Norfolk.
35. { Woolgar, G., Essex Industrial School, Chelmsford.
 Baggs, A. E., 18 Sebright Avenue, London Road, Worcester.
 Cardell, C. P., R.H.S. Gardens, Wisley, Ripley, Surrey.
 Ward, F. W., The Gardens, Scarthwaite, Caton, Lancaster.
39. { Weiss, G., White Oak School, Swanley, Kent.
 Bartlett, W., 5 Westgrove Terrace, Milverton, Leamington Spa.
 Sheldon, H., School of Gardening, Bredons Norton, Tewkesbury.
42. { Wood, B., Essex County Laboratories, Chelmsford.
 Hawkins, T. E., 123 Avenue Road, Gosport, Hants.
 Stares, G., 71 Village Road, Alverstoke, Hants.
44. { Coleman, F. C., Anglesey Lodge, Alverstoke, Hants.
45. { Hill, W., St. Bernard's, Upper Caterham, Surrey.
 Smith, W. T., The Avenue, Wivenhoe.
47. { Dalton, E., School of Gardening, Elmwood, Cosham, Hants.
 Steeds, J. A., National School, Cranleigh, Surrey.
49. { Image, J. d'E., Horticultural College, Swanley.
 Murgatroyd, T., School House, Eldwick, Bingley, Yorks.
51. { Kent, A., 8 Brune Terrace, Stoke Road, Gosport.
 Russell, S. G., 115 South Street, Gosport, Hants.

III.—JUNIORS' EXAMINATION,

SPECIALLY INTENDED FOR LADS AND YOUNG MEN,

WEDNESDAY, MARCH 25, 1908.

THE first Annual Examination for lads and young men was held on March 25, 1908, and conducted on similar lines to the General Examination.

Ninety-five candidates were entered for the examination, of whom four have been placed in the first class, twenty-two in the second class, and forty-seven in the third. Twenty-two failed to obtain sufficient marks to satisfy the examiners.

Speaking generally, we regret to say that the standard reached by the candidates was on the whole a very low one. Quite elementary questions are set at this examination, but it should be clearly understood by the candidates that a thorough knowledge of elementary facts is expected. In many cases it was only too evident that the candidates were insufficiently prepared for the examination, both in the way of having minds too little stored with the necessary elementary knowledge, and also in the power of expressing what they knew upon paper. In other cases an attempt at preparation had been made, by learning by rote an account of certain processes, with the object of reproducing the account verbatim. The usual result followed this course, for where it had been adopted a great lack of intelligence was evident in the answers given, and since the question set was not exactly like the question to which the account, perhaps somewhat imperfectly committed to memory, applied, the answer often failed really to fit the question at all. Attempts at memorising answers in this way only lead to the stifling of all intelligent interest in the operations the candidate is called upon to perform in the garden, and to the perpetuation of those rule-of-thumb methods which block all progress and, in altered circumstances, too often lead to disaster.

Another fault which calls for special mention is the failure on the part of many of the candidates to grasp the actual meaning of the question they were answering. Not one single question escaped this misunderstanding, although great care had been taken to make them very plain. Candidates should always very carefully read the question before attempting to answer it, so as to realise exactly what is asked.

Again, attention to every little detail is imperatively called for in the cultivation of every plant if success is to be deserved, and success cannot be attained in any branch of gardening without this attention, yet in almost every paper the evidence of lack of attention to detail was very plainly to be seen.

Few candidates appeared to thoroughly appreciate the benefits of hoeing, and fewer still were aware of the action of lime on a heavy clay soil. The word "flower" was often, of course incorrectly, taken to mean

"plant," and the question "to dig" or "not to dig" in connection with raspberries proved a pitfall to many. Considerable attention appears to have been paid to plant pests, but the word "blight" is still used to cover a multitude of things, where terms of more definite meaning might be better applied.

Candidates who have attained a low place in the examination or who have failed to pass should not be discouraged, but should endeavour to pay attention to, and observe, every little detail in the cultivation of the plants which are commonly grown in gardens, to the form which the plants assume, and to the way in which they respond to the care that is bestowed upon them. Only one candidate who attempted the question realised the difference between the tuber of the potato and the tuberous root of the dahlia, and yet, if only from a cultural point of view, knowledge such as this is of the utmost importance to any one who aspires to become a gardener.

FRED. J. CHITTENDEN, *Director*.
W. WILKS, *Secretary*.

First Class.

1. { Broadley, Percy, Castle Howard Farm School, Welburn.
Neville, Guy, 52 Maitland Street, Cardiff.
3. Bennett, W., 8 Kimberley Terrace, Cardiff.
4. Weiss, Gustavus, White Oak School, Swanley.

Second Class.

1. Rogers, Thomas, Desford Industrial School, Leicester.
2. { Buckley, T., Stoke Farm Reformatory, Bromsgrove.
Dashwood, Theo., Stoke Farm Reformatory, Bromsgrove.
4. Smidmore, W. J., Essex Industrial School, Chelmsford.
5. Roiall, John, Castle Howard Farm School, Welburn.
6. { Davis, Lazarus, Hayes Industrial School, Hayes End, S.O.
Francis, C., Desford Industrial School, Leicester.
7. { Ramm, V. C., Buxton (Norwich) Industrial School.
9. Gibbs, V. P. F., Kingswood Reformatory School, Bristol.
10. Carr, Joseph, Castle Howard Farm School, Welburn.
11. Zachnovitch, J., Hayes Industrial School, Hayes End, S.O.
12. Hurst, Etherington, Essex Industrial School, Chelmsford.
13. { Barnes, A. W., Buxton (Norwich) Industrial School.
Laversohn, M., Hayes Industrial School, Hayes End, S.O.
15. Saunders, A. W., Essex Industrial School, Chelmsford.
16. Freeman, R. J., Essex Industrial School, Chelmsford.
17. { Collins, R. H., Kingswood Reformatory School, Bristol.
Davies, Frank, Stoke Farm Reformatory, Bromsgrove.
19. Lapatoff, H., Hayes Industrial School, Hayes End, S.O.
20. Abel, Abraham, Hayes Industrial School, Hayes End, S.O.
21. { Greenwood, G. R., Stoke Farm Reformatory, Bromsgrove.
Gray, Robt., Reformatory School, Stranraer.

Third Class.

1. Thomas, C., Stoke Farm Reformatory, Bromsgrove.
2. { Spencer, R., Desford Industrial School, Leicester.
Brewer, D., Stoke Farm Reformatory, Bromsgrove.
4. { Playforth, G. E., Stoke Farm Reformatory, Bromsgrove.
Barter, Wm., Essex Industrial School, Chelmsford.
6. { Keloher, J. W., White Oak School, Swanley.
Ward, Geo., Shadwell Industrial School, Moortown, Leeds.
8. Sherr, M., Hayes Industrial School, Hayes End, S.O.
9. { Nierop, E. van, Hayes Industrial School, Hayes End, S.O.
Southgate, Fredk., Essex Industrial School, Chelmsford.
- { Symms, C., White Oak School, Swanley.
11. Nicholls, A., White Oak School, Swanley.
{ Green, James, Reformatory School, Stranraer.
14. { Parsons, A. E., Castle Howard Farm School, Welburn.
Broughton, A. O., Stoke Farm Reformatory, Bromsgrove.
16. Campbell, W., Reformatory School, Stranraer.
17. { Cox, F. J., Desford Industrial School, Leicester.
Hunt, Geo., Stoke Farm Reformatory, Bromsgrove.
- { Goodchild, H., Essex Industrial School, Chelmsford.
19. Walters, Wm., White Oak School, Swanley.
McCormick, J., Mossbank Industrial School, Millerston.
22. { Longstaff, J. W., Essex Industrial School, Chelmsford.
Davis, Samuel, Stoke Farm Reformatory, Bromsgrove.
24. { Giles, Alfred, Shadwell Industrial School, Moortown, Leeds.
Smith, J. W., Buxton (Norwich) Industrial School.
- { Greetham, P., Shadwell Industrial School, Moortown, Leeds.
26. { Foos, Lewis, Hayes Industrial School, Hayes End, S.O.
Skillings, W. F., Essex Industrial School, Chelmsford.
29. { Robinson, R., Stoke Farm Reformatory, Bromsgrove.
Collins, W. G., Stoke Farm Reformatory, Bromsgrove.
- { Cordon, R. O., Stoke Farm Reformatory, Bromsgrove.
31. { Barron, J., Essex Industrial School, Chelmsford.
Grahame, V. H., White Oak School, Swanley.
34. Wilson, T. D., Shadwell Industrial School, Moortown, Leeds.
Warriner, Geo., Stoke Farm Reformatory, Bromsgrove.
35. { Schweitzer, A., Hayes Industrial School, Hayes End, S.O.
Ert, Jack, Hayes Industrial School, Hayes End, S.O.
Krammer, M., Hayes Industrial School, Hayes End, S.O.
39. Varley, Thos., Shadwell Industrial School, Moortown, Leeds.
40. { Sargeant, G., Desford Industrial School, Leicester.
Beckerwich, M., Hayes Industrial School, Hayes End, S.O.
42. Bailey, Arthur, Stoke Farm Reformatory, Bromsgrove.
43. Phillips, A., Stoke Farm Reformatory, Bromsgrove.
44. { Chapin, D., Hayes Industrial School, Hayes End, S.O.
Schwalm, O., White Oak School, Swanley.
46. Hardwick, J., Stoke Farm Reformatory, Bromsgrove.
47. Hypson, J., Stoke Farm Reformatory, Bromsgrove.

IV.—EXAMINATION OF SCHOOL TEACHERS IN COTTAGE AND ALLOTMENT GARDENING,

APRIL 29, 1908.

1. PRACTICAL HORTICULTURE.

GENERALLY the questions relating to deep-soil working and leguminous plants were very fairly understood, some candidates giving really admirable replies. Onion cultivation on the whole was well described, though many were not familiar with all the methods of raising plants in order to secure large bulbs. Some candidates stumbled greatly over Raspberry cultivation, referring to seeds and cuttings rather than to the recognised method of propagation. Not all understood the proper characteristics of the winter moth, or the methods adopted as preventives of its attacks. Many candidates in relation to Plum-tree cultivation well understood the practices of root-pruning, and of feeding the tree and thinning the fruit when heavily cropped, but not the important point of making the most of the crop. The treatment of an old pasture for allotments found several candidates who were conversant with the subject, but the replies respecting the drainage were not on the whole so good. The propagation of Roses produced but few good replies, many being quite wide of the mark. The questions relating to Tender Annuals and to Hardy Flowers grown for sale yielded several very weak replies. On the whole those of the former were better than the latter. Not many attempted the last question relating to flowers for exhibition, nor were the methods of staging at all well described.

Taken as a whole the Examiners consider that there is a marked improvement in the general knowledge of the candidates, and in their fitness for teaching the elementary principles of cottage and allotment gardening. This knowledge when imparted to the scholars in the schools and to those who have either gardens or allotments under their care must be productive of good results in the near future. It will be well for future candidates to rely more upon their own close observation in relation to cultivation rather than to knowledge obtained only from books.

JAMES HUDSON, V.M.H.

ALEXANDER DEAN, V.M.H.

2. ELEMENTARY SCIENCE.

Optional questions of an elementary character on certain scientific points were set at this examination [such questions will be compulsory in future examinations], and the majority of the candidates attempted answers to one or more of them. The answers to the question concerning respiration in plants show that this important process is very little understood by the majority of the candidates. Accounts were usually given of transpiration and assimilation (photosynthesis), respiration

being either ignored or passed by as of quite secondary consideration. It may be well to emphasize the facts that respiration is a process having precisely the same meaning and importance in plants as in animals, and that it takes place in all living parts of plants during the whole period of their activity, whether they are exposed to light or not. The methods suggested to demonstrate respiration usually demonstrated something entirely different, and often, from the mode of arrangement of the apparatus, would have failed to demonstrate anything in connection with the plant at all. In describing the course of the water from the soil through the plant many old and long-abandoned ideas, such as the presence of "filters" on the roots and the course of the water along the "cambium layer," were revived; while "capillarity" was made to bear the brunt of the work in moving water from place to place in the plant. Simple experiments and observations such as should be within the reach of all of the candidates in this examination would conclusively prove the inaccuracy or insufficiency of such statements as these. The question dealing with the source of nitrogen for plant use was well answered by the majority, as was the one concerning the cabbage-white butterfly, although in both many candidates were content with incomplete answers lacking in essential details. The place of pupation of the cabbage-white butterfly was inaccurately stated by many.

F. J. CHITTENDEN, F.L.S.

CLASS LIST.

First Class.

1. Jones, T. O., Arvon House, Elmswell, Bury St. Edmunds.
2. Brown, J. W. H., Harman's Farm, Marston, Oxford.
3. { Ashley, E. W., Ivy House, Quainton, Aylesbury.
- { Heald, J., Longton C.E. School, near Preston, Lancs.
5. { Ashton, E., Yorktown Council School, Camberley.
- { Grimble, S. W., 23 Caernarvon Road, Norwich.
7. { Burton, W., Lancashire County School of Gardening, Ormskirk.
- { Eayrs, E. M., School House, Girton, Cambridge.
- { Wheeler, F. G., 12 Kemble Road, Forest Hill, S.E.
10. Pilgrim, M., Seven Hills School, Nacton, near Ipswich.
11. Ainsworth, J., Whixall Council School, Whitechurch, Salop.
12. { Parker, T. J., Strand, Quainton, Aylesbury.
- { Taylor, A. T., 18 Faulkland Road, Durley Park, Bath.
14. Hooper, H. B., Nacton School, Ipswich.
15. Davies, E. P., Crudgington Schools, Wellington, Salop.
16. { Sowerbutts, R., 160 Keighley Road, Colne, Lancs.
- { Wilford, W. C., Lancashire County School of Gardening, Ormskirk.
18. { Buckingham, H. J., School House, Frimley.
- { Edgington, W., Town Street School, Brandon, Suffolk.
- { Lock, W., School House, Eardisley, Hereford.
21. Barradell, H., Brome School House, Eye, Suffolk.
22. { Ball, C., School House, Merstham, Redhill.
- { Perry, G. M., Lancashire County School of Gardening, Ormskirk.

24. { Francis, F. W., Wormbridge School, near Hereford.
Morgan, P., School House, Almeley, Hereford.
26. Clarke, C. W., St. John's School, Caterham Valley.
27. { Paine, E., The Schools, St. Paul's Cray, near St. Mary Cray.
Swire, W., Lancashire County School of Gardening, Preston.
29. { Blyth, J. C., 59 Connaught Road, Norwich.
Irlam, W. E., Lancashire County School of Gardening, Ormskirk.
31. { Hope, T. B., Post Office, Oulton Broad, Lowestoft.
Parkinson, G. H., Griffin Street, Broughton-in-Furness.
Rudman, H. J., Fosse Way, Haygrove, Bridgwater.
Turner, J. C., School House, Barnham, Thetford.
35. { Ensor, E. H., County Technical School, Stafford.
Myles, T. H., Lancashire County School of Gardening, Preston.
37. Ionsdale, G. W. T., School House, Tilford, Farnham.
38. { Booy, R. H., Middlesex County School of Gardening, Ealing.
Kidd, A. J., King Edward School, Chatteris, Cambs.
Wyatt, S. J., County Technical School, Stafford.
41. { Roberts, G. W., Great Glemham School, Saxmundham.
Searle, J. C., 8 Woodsome Road, Highgate Road, N.W.
Slinger, J., North Road Farm, Carnforth.

Second Class.

1. Chatterley, W. M., School House, Harvington, Evesham.
2. { Davis, J. V., Wellington School, Hereford.
Francis, W. Rushmere, St. Andrew's School, Ipswich.
Mileham, J. W., School House, Long Ditton, Surrey.
Burgess, W. H., County Technical School, Stafford.
Cole, H. E., Melrose, The Grange, Beccles, Suffolk.
Collier, W. G., Friern Lane, Whetstone, N.
Dewey, G. W., Boys' School, Campden, Glos.
5. { Palmer, J. W., School House, Wigmore, Herefordshire.
Punfrey, W. H., Pulham St. Mary Magdalen, Harleston.
Quadling, B. J., Linden House, Carlton Colville, Lowestoft.
Quinn, J. H., Redcott, Lewes Road, Sutton, Surrey.
Robertson, H. J., Crook's Place School, Norwich.
14. { Barton, J. E., School House, Charlbury, Oxon.
Bramley, J. A., The Schools, West Walton, Wisbech.
Wilkins, A., Stourpaine, Blandford, Dorset.
17. { Bradley, G., Lancashire County School of Gardening, Ormskirk.
Rogers, A. J. R., Pretoria House, Frimley Road, Camberley.
Wylam, J., School House, Howtel, Mindrum, Northumberland.
20. { Collins, W. H., The School House, Bathford, Bath.
Jago, E., Beehive School, Ilford.
Pye, H. W., Mona Cottage, Aylsham Road, Old Catton, Norwich.
23. { Booen, G. R., Raydon School, Hadleigh, Ipswich.
Evans, J., 10 Cross Street, Tamworth.
Redfern, J., School House, Titley, Herefordshire.
Slack, H. E., 55 Cecil Avenue, Enfield.
27. { Crook, A. L., School House, Hildenborough, Kent.
Parsons, H., Bailey's Lane School, Stamford Hill, N.

- Jones, W. J., 18 High Street, Milton, Stoke-on-Trent.
 29. Porter, J., Lancashire County School of Gardening, Preston.
 Webb, E., High Street, Burwell, Cambridge.
 Adams, H., 12 Buckhurst Road, Frimley Green.
 Barnell, H. J., Ashleigh, Cromwell Road, Luton, Beds.
 32. Chasmar, A. H., Grosmont Road, Plumstead Common, S.E.
 Dennison, J. E., Elmside, Wotton-under-Edge, Glos.
 Sharman, S., Middlesex County School of Gardening, Ealing.
 Simmonds, W. J., Mulbarton School, Norwich.
 Hobson, J., Lancashire County School of Gardening, Ormskirk.
 38. Holden, E., School House, Great Hampton, Evesham.
 Hughes, J., Prion School, Denbigh.
 Campbell, A., Yarkhill School, near Hereford.
 41. Hudson, J. F., Highfield, Gloucester Road, Kingston-on-Thames.
 Tombs, J. D., School House, Chedworth, S.O., Glos.
 44. Castle, J. C., Lancashire County School of Gardening, Preston.
 Coombes, A. J., Pencoyd School, Ross, Herefordshire.
 Bird, L. H., 50 Graham Road, Wimbledon.
 Goodyear, C. A., Lancashire County School of Gardening, Ormskirk.
 46. Howe, J. W., County Technical School, Stafford.
 Hoyle, G., Prospect House, Darfield, Barnsley, Yorkshire.
 Shambrook, J. C., Sunnyside, Gossley, Glos.
 Smart, T. M., Llwyn Celyn, Dinorwic Street, Carnarvon.
 52. Arnott, J. W., Belleau School, Aby, Alford.
 Wigg, F. S., School House, Mileham, Swaffham.
 Bagnall, H., Knighton School, Market Drayton.
 54. Parfett, S. W., 37 West Road, Sawbridgeworth.
 Perry, M. W. R., School House, Alfold, Billingshurst.
 Ward, J., School House, Thorpe Morieux, Bury St. Edmunds.
 58. Roe, E., Middlesex County School of Gardening, Ealing.
 59. Holden, R. A., Lancashire County School of Gardening, Preston.
 Beacroft, A., Portland House, Cotmanhay Road, Ilkeston.
 60. Hardman, A. J., County Technical School, Stafford.
 Higgins, T. F., Kidmore End School, Reading.
 Hoyle, J. W. J., Lancashire County School of Gardening, Preston.
 Clarke, H., School House, Walton, Aylesbury.
 Gowers, E. A., Gardenside, Sudbury, Suffolk.
 64. Jefford, T. R., Woodville, Gillingham, Dorset.
 Knappett, A. A., Melton School, Woodbridge.
 Maggs, A. J., County Technical School, Stafford.
 Smith, H., English Dicknor School, Coleford, Glos.
 Butt, A., Granby School, Ilkeston.
 Harrison, W., Lancashire County School of Gardening, Preston.
 70. Holley, H. A., Melrose, The Grange, Beccles.
 Morrison, E. A., Claydon, near Ipswich.
 Sinkin, W. J., County Technical School, Stafford.
 Chadwick, A. C., Laurel Cottage, Perrycrofts, Tamworth.
 75. Haworth, D. O., Lancashire County School of Gardening, Ormskirk.
 Nichols, J. W., School House, Bleasdale, Garstang, R.S.O.
 Norton, A. E., 20 St. Philip's Road, Norwich.

79. { Grosvenor, F. E., County Technical School, Stafford.
 Smith, M. B., Middlesex County School of Gardening, Ealing.
 Worthy, E. H., School House, Turnditch, Derby.
82. { Flamank, W. J., County Technical School, Stafford.
 Salter, H. B., Middlesex County School of Gardening, Ealing.
84. { Bates, A. W., Burghill, near Hereford.
 Beard, F. W., County Technical School, Stafford.
 Burgess, W. H., The School, Dunkirk, Faversham.

Third Class.

- Crowther, P. S., Ryeworth, Charlton Kings, Cheltenham.
 Elford, J. S., Byton, Presteigne, Radnorshire.
 Gregson, J., Lancashire County School of Gardening, Preston.
1. Hooper, O., County Technical School, Stafford.
 Horton, J. W., Lancashire County School of Gardening, Ormskirk.
 Wilson, F. O., Lancashire County School of Gardening, Preston.
7. { Hall, J. W., 53 School Street, Darfield, near Barnsley.
 Lewis, E. W., Lancashire County School of Gardening, Ormskirk.
- { Kilby, L. T., Council School, Southstoke, Reading.
9. { Lamb, G., Peny Park School, Clifford, Hereford.
 Rowntree, H. C., Church Street Council School, Woking.
12. Rumbol, G. R. J., Wildmore Council School, Lincoln.
13. Greenwood, E., Lancashire County School of Gardening, Preston.
14. Penn, W. J., Lancashire County School of Gardening, Preston.
 Barker, H., County Technical School, Stafford.
15. { Clegg, E. A., Lancashire County School of Gardening, Preston.
 Smith, J. A., Harkstead School, near Ipswich.
 Wright, G. F., Council School, Betchworth, Surrey.
- { Greenwood, H., Humber School, Leominster.
19. { Lawton, H., Claremont Road, Marlow, Bucks.
 Thornton, A., School House, Kingswood, Wotton-under-Edge.
22. { Allen, J., 82 Portland Road, Rushden Road, Northants.
 Handel, F. G., 31 Portman Street, Taunton.
24. Nicholls, E. G., Lancashire School of Gardening, Ormskirk.
 Marshall, E. C., Glenthorne, Carysfort Road, Crouch End, N.
25. { Martin, T. E., Lancashire County School of Gardening, Preston.
 Wrigglesworth, F., Rockshaw Cottage, Merstham, Redhill.
 Yates, J., Lancashire County School of Gardening, Preston.
29. { Hoy, A. E., Industrial School, Fyfield, Ongar.
 Reading, C. F., Vale, Guernsey, Channel Isles.
31. Appleford, F. W., Claremont, Manor Road, Guildford.
32. Wilson, J., Lancashire County School of Gardening, Preston.
33. { Smith, W. R., School House, Hatfield, Leominster.
 Taylor, G., Acton, Sudbury, Suffolk.
- { Brooks, J., Chedzoy, Bridgwater.
35. { Dent, F. M., County Technical School, Stafford.
 Hinks, A. E., 58 Elmore Green Road, Bloxwick, Walsall.
 Stanley, W. E., The Orphanage, Spring Bank, Hull.

- (Apter, H. P., North Petherton Council School, Bridgwater.
39. { Bonney, J., Lancashire County School of Gardening, Preston.
 { Leyland, J. H., Lancashire County School of Gardening, Ormskirk,
 { Bishop, E., East Peckham, Kent.
42. { Jackson, J. S. R., County Technical School, Stafford.
 { May, A., School House, Longtown, Abergavenny.
45. Rushton, A., Lancashire County School of Gardening, Preston.
46. Hale, F. W., Middlesex County School of Gardening, Ealing.
 { Jones, W., Lower Street, Quainton.
47. { Pearce, J., Lancashire County School of Gardening, Ormskirk.
 { Tench, R. J., The School, Dilhorne, Stoke-on-Trent.
50. Bryan, T. G., County Technical School, Stafford.
51. { Birkenhead, H. T. G., Gislingham, Eye, Suffolk.
 { Rhodes, W. P., School House, Knypersley, Congleton.
53. { James, T. W., The Cottage, West Down S.O., Devon.
 { Johnson, G. H., Eversley House, Brooke, Norwich.
55. MacAuley, J. H., Middlesex County School of Gardening, Ealing.
 { Driver, J. B., North Nibley School, Dursley, Glos.
56. { Harry, W., Kenwyn House, Marazion, Cornwall.
 { Jones, T., County Technical School, Stafford.
59. Miles, A., County Technical School, Stafford.
60. { Barton, J. D., Royal Institution for the Deaf, Margate, Kent.
 { O'Connor, G., Garland's Cottage, Ewhurst.
 { Bentham, A., Lancashire County School of Gardening, Ormskirk,
 { Colver, W., Carnarvon Grove, Carlton, Nottingham.
 { Coughlan, J. V., 64 Stoke Road, Guildford.
62. { Hull, W., Lancashire County School of Gardening, Preston.
 { Lanham, A., Lancashire County School of Gardening, Preston.
 { Moseley, E., School House, Walterstone, Abergavenny.
 { Pentney, T., 29 High Street, Camberley.
 { Witcombe, H. C., Playing Close, Charlbury, Oxon,

R.H.S. EXAMINATIONS IN 1909.

1.—GENERAL EXAMINATION.

Candidates must be eighteen years of age or over eighteen.

WEDNESDAY, APRIL 21, 1909.

The Council of the Royal Horticultural Society, sympathising with the efforts of various County Councils, Technical Institutes, Schools, Gardeners' Mutual Improvement Societies, and other bodies to promote instruction in Practical Horticulture by means of Lectures, Demonstrations, &c., and in the hope of rendering such teaching more definite and effective, have consented to hold an Examination in Horticulture on Wednesday, April 21, 1909.

A Scholarship of £25 a year for two years is offered by the Royal Horticultural Society, to be awarded after the General Examination, to be held on April 21, 1909, to the Student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of eighteen and twenty-two years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students.

2.—GENERAL EXAMINATION.

For Juniors under eighteen years of age.

WEDNESDAY, APRIL 21, 1909.

An Examination will also be held on Wednesday, April 21, 1909, for candidates under the age of eighteen years. Candidates will be expected to possess a knowledge of certain of the more elementary portions of the Syllabus of the General Examination.

3.—SCHOOL TEACHERS' EXAMINATION IN COTTAGE AND ALLOTMENT GARDENING.

WEDNESDAY, APRIL 28, 1909.

The Council of the Royal Horticultural Society will hold an Examination in Cottage and Allotment Gardening on Wednesday, April 28, 1909. This Examination is intended for, and will be confined to, Elementary and Technical School Teachers. It has been undertaken in view of the increasing demand, especially in country districts, that the School Teachers shall be competent to teach the elements of Cottage and Allotment Gardening, and of the absence of any test whatever of such capacity.

4.—PUBLIC PARKS EXAMINATION.

MONDAY, JANUARY 11, 1909.

Intended only for men employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies, and not for general Gardeners.

The Council of the Royal Horticultural Society has consented to hold a Special Examination for Gardeners employed in the London and other City and Public Parks and Gardens on Monday, January 11, 1909, at their Hall in Vincent Square, Westminster.

Copies of the 1909 Syllabus, covering the Examinations mentioned above, may be obtained from the Society's Offices, Vincent Square, London, S.W. A stamped, addressed envelope should be enclosed.

BOOKS RECOMMENDED FOR STUDY.

Candidates may with advantage consult some of the following works. [The figures in front of each work indicate the Examination for which they are considered to be most applicable.]

- 1, 3. **Agricultural Botany**, by John Percival, F.L.S. (Duckworth, 3 Henrietta Street, W.C.), 7s. 6d.
- 1, 3. **Elementary Botany**, by J. W. Oliver (Blackie & Son, 50 Old Bailey E.C.), 2s.
- 1, 3. **Primer of Botany**, by Sir J. D. Hooker, K.C.S.I. (Macmillan & Co., St. Martin's Street, W.C.), 1s.
- 1, 3. **Structural Botany** (Flowering Plants), by Dr. D. H. Scott (A. & C. Black, Soho Square, W.C.), 3s. 6d.
- 1, 2, 3, 4. **The Chemistry of the Garden**, by H. H. Cousins (Macmillan & Co.), 1s.
- 1, 2. **The Forcing Book**, by Prof. L. H. Bailey (Macmillan & Co.), 1s.
- 1, 2, 3. **Profitable Fruit Growing**, by J. Wright, V.M.H. ("City Press" Office, Aldersgate, E.C.), 1s. 3d.
- 1, 2, 3. **The Principles of Fruit Growing**, by Prof. L. H. Bailey (Macmillan & Co.), 5s.
- 1, 2, 3, 4. **Thompson's Gardeners' Assistant**, New Edition by W. Watson, 6 vols. (Gresham Publishing Co., 34 Southampton St., Strand), £2 8s.
- 1, 2, 3, 4. **Garden Flowers and Plants**, by J. Wright, V.M.H. (Macmillan & Co.), 1s.
- 1, 2, 3, 4. **Paxton's Calendar of Garden Operations** ("Gardeners' Chronicle" Office, 41 Wellington Street, W.C.), 7½d.
- 1, 2, 3, 4. **Pictorial Flower Gardening**
- 1, 2, 4. **Pictorial Greenhouse Management**
- 1, 2, 3. **Pictorial Vegetable Growing**
- 1, 2, 3. **Pictorial Fruit Growing**
- 1, 2, 3. **Pictorial Practical Gardening**
2. **The Alphabet of Gardening**, by T. W. Sanders (Collingridge, 148 Aldersgate Street, E.C.), 1s. 6d.
- 2, 3. **Primer of Horticulture**, by J. Wright, V.M.H. (Macmillan & Co.), 1s.
- 1, 2, 4. **The Horticultural Note Book**, by J. C. Newsham, Ed. 2 (Lockwood, 7 Stationers' Hall Court, Ludgate Hill), 1s. 6d.
- 1, 2, 3. **Farm and Garden Insects**, by W. Somerville, D.Sc. (Macmillan & Co.), 1s.
- 1, 3. **Natural History of Plants**, 2 vols., by Kenner & Oliver (Blackie & Son), 30s.
3. **Nature Teaching**, by Francis Watts, B.Sc., and W. G. Freeman, B.Sc. (John Murray, 50, Albemarle Street, London, W.), 3s. 6d.
- 1, 3. **Plant Breeding**, by Prof. L. H. Bailey (Macmillan & Co.), 4s.
- 1, 3, 4. **The Pruning Book**, by Prof. L. H. Bailey (Macmillan & Co.), 5s.
- 1, 3, 4. **The Soil**, by A. D. Hall, M.A. (John Murray), 3s. 6d.
- 1, 3, 4. **The Spraying of Plants**, by E. G. Lodeman (Macmillan & Co.), 4s.
- 1, 2, 3. **Vegetable Culture**, by A. Dean (Macmillan & Co.), 1s.
- 1, 3. **The Principles of Vegetable Gardening**, by Prof. L. H. Bailey (Macmillan & Co.), 4s.
- 2, 3. **Lessons in Cottage Gardening**, by A. A. Kerridge (Paternoster Publishing Society, 77 Fleet Street, E.C.). Bound in cloth, 2s. 6d.; in paper cover, 1s.

The Questions set at all the Society's Examinations—from 1893 to 1907—are now published in book form, and will prove very useful to intending candidates. To be obtained from the Society's Offices, Vincent Square, Westminster. Price 2s. Anyone purchasing these 1893-1907 Questions can obtain a free copy of the Questions set at the 1908 Examinations. Applicants should state which Examination Paper they require.

The Examinations (except the 'Public Parks Examination') will be held simultaneously in as many different centres in Great Britain and Ireland as circumstances may demand.

The Society is willing to hold an Examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to Examinations will consent to supervise one on the Society's behalf, and in accordance with the rules laid down for its conduct. But for obvious reasons no School Teacher should act as supervisor at the School Teachers' Examination

If any Candidate desires to sit in London for examination he must say so on his entry form, and the Society will then make arrangements for him to attend at their Hall in Vincent Square, Westminster, S.W.

A capitation fee of 5s. will be charged for every Candidate (except for the Junior General Examination, for which the fee will be 2s. 6d.), in order to partially defray the expenses of the Examination. No entry fees can be returned.

Intending Candidates must, as far as possible, give all the information asked for on the entry form, which may be obtained at the R.H.S. Office, Vincent Square, London, S.W., and which should be filled in and returned at least three weeks before the date of the Examination to which it applies.

When this form, duly filled up, has been returned, the Society assumes that the Candidate has already made all necessary arrangements with his Supervisor as to the place where the Examination will be held, &c.; therefore no further notice will be sent to him, except a postcard to acknowledge receipt of entry form and capitation fee. The questions will be sent direct to the Supervisor, whose name and address must be correctly written on the lines provided on the entry form.

Every Paper of Questions sent by the Society to the Supervisor will be numbered separately, and Candidates must write that number distinctly on the top of every sheet of paper he hands to the Supervisor. He must also send his name and address privately to the Society in an envelope which will be sent for the purpose with each Paper of Questions.

The Royal Horticultural Society will award a Medal to the Candidate gaining the highest number of marks in each of the Examinations, and will also, as soon as possible, send a report of the Examination to each Candidate and Supervisor, and Certificates to the successful Candidates.

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PART II.

YELLOW-STRIPE IN DAFFODILS.

By H. R. DARLINGTON, F.R.H.S.

[Lecture delivered June 9, 1908.]

DAFFODIL growers have long boasted of the immunity their favourites enjoy from the attacks both of disease and insect enemies. The late Mr. Burbidge wrote: "Fortunately the Narcissus is in most cases sufficiently vigorous in constitution to ward off those agents of decay which are common to plants of a more delicate character, and it is probable that their poisonous qualities protect them from the ravages of many insects, just as they escape being eaten by cattle from the same cause. Even mice, which are so fond of the Crocus, never attack Narcissus bulbs." Mr. Kirby, in his book on daffodils, heads a chapter, "The One Insect and the One Disease," referring to the daffodil fly and basal rot.

It almost seems that the modern daffodil is losing this immunity. I have myself recently called attention to the destruction wrought in daffodil beds by a caterpillar, afterwards identified as that of the common Swift Moth, from which I have, to my regret, again suffered this year; while the occurrence of yellow-stripe in certain varieties of daffodil is now becoming sufficiently common to render it desirable to make such inquiry into its cause as may be practicable, and, if it be possible, to find a remedy.

"Yellow-stripe" shows itself in a mild case as a scarcely perceptible chloration or yellowing of the veins of the leaves, and may then have little noticeable effect on the flowering or health of the plant. In a more serious case distinct bands of yellow are seen running lengthways up the leaves; the flowering becomes weaker, the petals deficient in substance and colour, and both leaves and flowers fade prematurely. In a very bad case, no flowers at all will be produced, and the leaves are heavily streaked with yellow and wither and fade before they fully develop.

The yellow stripe may run the whole length of the leaf, but does not generally do so, except in a bad case, when the leaf is often curved or

misshapen. Often one stripe will run some distance up the leaf and others parallel to it for a much shorter distance. One side of the leaf is more often affected than both sides. Two stripes on one side are more common than one on each side of the middle of the leaf. If both sides of the leaf are striped the attack is generally a severe one. When the leaf is held to the light the yellow stripes are more translucent than the rest of the leaf, and sometimes the appearance presented is not unlike that caused by the celery fly when a whitish grub burrows through the leaf of the celery; but no grub is to be found in the daffodil leaf.

Yellow-stripe is generally most noticeable in the part about half way up the leaf, and it will often be found that both base and tip of the leaf are free from stripe though the central part is affected. Yellow-stripe is quite distinct in appearance from the fading or the yellowing of the leaf which takes place every summer. This begins with the upper end of the leaf and gradually proceeds downwards. It is also distinct from the yellowing of the tips of the leaves caused by basal rot.

Yellow-stripe appears to be common only in certain garden varieties of daffodils. Among the trumpets I have noticed it in 'Princeps,' 'Hume's Giant,' 'M. J. Berkeley,' and 'Matson Vincent'; in the *Incomparabilis* section in 'C. J. Backhouse,' 'Sir Watkin,' 'Queen Catherine,' 'Flora Wilson,' 'Flambeau,' 'Beatrice,' 'Mrs. C. Bowley,' and a few others; in the *Poeticus* section, if I except a doubtful case of 'Cassandra,' I have only noticed it in 'Almira.'

Whether yellow-stripe be itself a specific disease or merely a symptom that something is wrong with the plant, or a sort of daffodil anemia—that is to say, an indication of inherent debility in the varieties affected by it—is the subject of the present inquiry. Whatever its nature, a bad case is always accompanied by other signs of weakness.

If it be a specific disease we might fear it likely to prove infectious to other bulbs, and the method of treatment would be either to destroy all affected bulbs or to seek for some specific treatment to combat the malady. If it arise from unsuitable environment of the plant, each case would require to be studied and an appropriate remedy applied. If it is an inherent debility in the variety, perhaps the sooner we ceased to grow that variety the better.

Yellow-stripe seems to have attracted notice only recently; at all events, it is not mentioned by the older writers on daffodils. Messrs. Burbidge and Baker ("The Narcissus, its History and Culture," 2nd edition, 1875) and Mr. Bourne ("The Book of the Daffodil," 1903), both treat of the diseases of the daffodil, but neither of them refer to "yellow-stripe."

Attention was called to yellow-stripe in the "Commonplace Notes" contained in vol. xxviii. of the JOURNAL R.H.S., published 1904. The "multitude of divergent opinions" as to the origin of the trouble is referred to, and the absence of any fungus disease in the plants affected noted. It is also stated that certain varieties—*e.g.* 'Princeps,' 'C. J. Backhouse,' and 'Sir Watkin'—are very liable to the disease, and 'Horsfieldi' slightly so. I think all growers will agree with this. In my own experience 'M. J. Berkeley' is one of the most prone to attack.

In the spring of 1906, which was in my garden the worst year for the

disease I have experienced, several articles on the subject appeared in "The Garden," and Mr. Goodwin noted the occurrence of the disease in a bulb of 'Blackwell,' and said he had attributed it to want of change in the soil, whilst a botanist friend had reported that it was believed to be caused by *Bacterium hyacinthi*, a disease of hyacinths which is well known in Holland and attacks the bulbs in a resting condition. ("The Garden," April 1906, p. 198).

Later in the same publication (p. 229) Miss Currey suggested that the cause was to be sought in over-division of the bulbs, a suggestion which is supported by Mr. Watts (p. 271). But on the same page, Mr. Jacob says he has found 'Sir Watkin,' 'Princess Ida,' and 'Grand Duchess' among the worst offenders, and he arrives at the conclusion that if it be a disease it is not an infectious one. He does not think it is caused by the division of the bulbs, and suggests cold as a possible cause. Mr. Peter Barr (p. 308) notices yellow-stripe as a characteristic of 'M. J. Berkeley,' and puts it down to some inherent weakness, but considers the bulbs, though affected, do better in the grass. In 1907 (p. 75), "K.," from North Devon, mentions an outbreak in a row of 'Sir Watkin' which he can attribute neither to cold, nor to over-dividing, nor to infected soil, "but if to anything besides constitutional liability, then to heat." He thinks the disease may arise from growing large quantities of bulbs with no other vegetation distributed among them, and advocates planting alternate rows of other plants among the daffodils. On the other hand, Mr. Rollo Meyer, of Ampthill (p. 284), has daffodils planted in rows, in the grass, and in clumps between perennials, and finds instances of yellow-stripe among the plants in all three positions. On p. 402 reference is made to an opinion expressed at a meeting of the Scientific Committee of the R.H.S. that the disease came from over-manuring, and a statement by Mr. Bennett-Poe and Mr. Douglas that if plants affected were cultivated in unmanured soil they would recover. Mr. Leonard Buckland (Australia), p. 414, regards "continual change of soil, maiden loam if possible," as a remedy for the disease.

Mr. A. M. Kirby ("Daffodils," 1907, p. 22), writing of America, seems, like the R.H.S. Committee, to attribute yellow-stripe to the presence of manure. He says: "Year after year, until I learned to be more strict, I used to see here and there a sickly yellowish-leaved stunted daffodil plant. An examination of the soil almost invariably disclosed a lump of manure either in contact with the bulb or where its roots should have been—probably had been, but were destroyed by contact with raw manure"; and I gather (p. 85) that he found the spring of 1906 specially bad for yellow-stripe, but is inclined to put down the trouble to a covering of manure he had used.

With reference to the suggestion that manure, or at least rank manure, may be the cause of the trouble, it is, I think, desirable to distinguish the true yellow-stripe from an injury undoubtedly caused by manure in which the whole leaf of the daffodil is turned yellow by a transverse band often sharply defined, and *not* running longitudinally down the leaf. This transverse band may be noticed where the beds have been given a heavy top-dressing of manure, and cold weather has arrived and checked the growth after the leaves have begun to push their

way through the soil. In such cases the leaf below the yellow band may be found green and healthy; probably only a leaf or two here and there will be affected, and the flowering capacity of the plant does not seem to be impaired. Injury of this character always affects the outside of the leaf. True yellow-stripe, on the other hand, seems in a mild case to affect the interior of the leaf, and, at least so far as my observations go, is never sharply defined transversely. I have for years grown several of the stronger varieties of daffodil, including 'Sir Watkin,' among roses, in beds that have received annually a heavy dressing of manure in the autumn, and though I have occasionally seen this local yellowing of the foliage I have never noticed a trace of true "yellow-stripe" in these plants.

My own experience does not accord with the manuring theory. I first noticed yellow-stripe in my garden in the spring of 1905, but the attack was not serious. In 1906 I experienced the worst attack I have had, 'M. J. Berkeley' and 'C. J. Backhouse' being the most affected and 'Sir Watkin' suffering considerably. My worst case was a group of 'M. J. Berkeley' on a rather dry shelf in the rock garden; every plant in the group was affected, and they produced not a single flower. Not a particle of manure had been near the site for years, but it was a position I consider too dry for daffodils as a rule. So bad was the attack that I had intended to dig up and throw away the bulbs, but to do this I should have risked disturbing other plants which I valued more. I therefore gave the bed two rather heavy dressings of Tonk's manure, and several waterings in the course of 1906; and in the following spring I also treated the other bulbs affected with yellow-stripe with dressings of Tonk's manure, but not such heavy ones. The result, somewhat to my surprise, was entirely successful. All the bulbs bloomed well in 1907, and I did not notice a trace of yellow-stripe anywhere in my garden. The flowers of this particular group of 'M. J. Berkeley' were specially good and lasted well. I am not certain, however, that the result is to be attributed to the treatment the bulbs received.

The spring of 1906 was one in which the leaf growth was particularly early and hard weather was experienced after the leaves had shot through the ground. 1907, on the other hand, was with me a particularly late season; I find, in fact, that many varieties were a fortnight behind their time of flowering in the previous year (1906). The year 1908 has proved an even later year than 1907, a comparison of the daffodil flowers open on similar dates in the two years showing that in most cases the flowers have opened about a week later in 1908 than in 1907. This, though unfortunate from the point of view of the exhibitors, does not seem to be altogether so for the plants, for I have seen only a few cases of yellow-stripe in my garden in 1908, and in those the plants are not badly affected. There is this year more yellow-stripe in my garden than in 1907, but the cases are of a mild type.

Now it seems worth notice, in the first place, that the varieties most prone to be affected with yellow-stripe are nearly all early varieties. 'Sir Watkin' and 'C. J. Backhouse' are usually among the first of the *Incomparabilis* section to flower, and 'M. J. Berkeley,' though actually flowering after some of the early trumpets are in bloom, is one of the first of them

to push its leaves through the soil in early spring, and is consequently one of those most likely to suffer injury from frost and easterly winds. 'Mrs. C. Bowley,' and some others in which I have noticed yellow-stripe are, it is true, later, but I have not seen a bad attack except in the early varieties.

After some hesitation I have come to the conclusion that Mr. Jacob's theory of cold being the cause of yellow-stripe may be a probable explanation of its occurrence in the particular cases I have mentioned. I was at first of opinion, as my treatment indicated, that poverty of soil and drought might be the cause of the attack. It was a possible explanation in the case of the group of 'M. J. Berkeley,' one group of 'C. J. Backhouse,' and two rather large groups of 'Sir Watkin,' but on further investigation I found a bed of 'Sir Watkin' badly attacked in 1906, growing in a soil particularly rich and deep, and a small group of 'C. J. Backhouse' in almost pure peat, where drought was very unlikely to have occurred, also suffering in that year. It is quite clear that in varieties not particularly prone to the disease poverty and drought will not cause it. I have been observing with considerable interest a bed of 'Stella' planted under a cedar tree. The plants have been gradually starving for years. They have long since ceased to flower and the leaf growth is getting more and more restricted each year, but I have never detected in any of them the least trace of yellow-stripe.

But to come back to the group of 'M. J. Berkeley' I referred to as having, in 1906, the worst attack I have seen. I have already mentioned that manure is not in this case a possible explanation of the attack. It is equally impossible that it can have arisen from over-division of the bulbs, for at the time they suffered from it they had not been lifted for over three years, and had twice (in 1903 and 1904) flowered fairly satisfactorily since their planting. Moreover, their complete and unexpected recovery in 1907, without being moved, shows that, other conditions being satisfactory, change of soil and "maiden loam" are not necessarily essential to apparently complete recovery.

Again, the occurrence of yellow-stripe may nearly always be observed in the neighbourhood of bulbs that have been attacked by the caterpillar of the Swift Moth. Now the method of attack of the caterpillar is this. The eggs of the moth are laid either in a colony on one bulb or on several bulbs close together. The caterpillars hatch in late summer or autumn and commence to feed on the fleshy roots emitted by the bulb, and when they have eaten all the roots off the bulb, and perhaps bored into the bulb itself (but not usually very far in), they find their way through the soil and attack the roots of other bulbs growing near. The bulbs are thus destroyed in a patch, but those on the outside of the patch will have their roots only partially destroyed, and among these yellow-stripe will almost always be found.

In these circumstances I have found yellow-stripe in the leaves of 'Mrs. Langtry,' a variety not as a rule subject to it. When bulbs attacked in this way develop yellow-stripe, it seems reasonable to attribute the disease to the physical injury caused by the caterpillars.

If the caterpillar has eaten all the roots it may sometimes attack the shoots as well, but it seems to care less for the shoots than the roots.

If the leaves come up when all the roots have been eaten, then the leaves will turn brown at the tips and make very little growth. They then look much like the leaves of a bulb attacked by basal rot. The cases where the leaves show yellow-stripe on the margin of the area of destruction seem to be those where parts only of the roots have been eaten by the caterpillars.

I think, therefore, that the various methods of accounting for the yellow-stripe suggested by the writers I have cited, excepting that of cold, are not applicable to the cases I have mentioned in my own garden, but I by no means wish to suggest that they may not be perfectly accurate in the particular instances which were in the minds of the writers.

The observations of the writers I have cited and my own may be satisfactorily reconciled if we admit that yellow-stripe is a symptom, and not a specific disease, and that it may occur as a consequence of unsuitable condition of the soil, or inclement weather at a critical stage in the growth of the plant, or sometimes of physical injury to the bulb or its roots. Subject to additional and more accurate observation, I think it impossible to go further at present.

The conclusion is unsatisfactory in one sense—namely, that it does not enable one, on seeing the occurrence of an outbreak, at once to apply a remedy. We must go further and inquire what is the unsuitable condition to which the plant has been subjected. But if correct, the conclusion has also a satisfactory side, for we need not at once dig up and discard the affected plants (as is desirable, for instance, in the case of basal rot), but we may hope by altering the conditions of growth, or (if the weather be at fault), in a more favourable season, to find the bulbs recover and again become satisfactory plants.

I venture to sum up my observations of the occurrence of yellow-stripe as follows :

1. It is a phenomenon comparatively recently noticed.
2. It is confined to a few garden varieties of *Narcissus*.
3. It seems connected with debility in the plant, the leaves are less robust than usual and decay earlier than those of healthy plants. In a bad case the bulbs refuse to flower at all.
4. The origin of the phenomenon has been assigned by growers of experience to a great variety of causes.
5. It is more prevalent in some years than in others, and plants badly affected one year may show complete recovery the next year.
6. It is not accompanied by discoloration of the bulb or any apparent fungoid growth.
7. It does not appear to be infectious.
8. In particular cases both cold and partial destruction of the roots seem probable explanations of the phenomenon.

ON THE ABSORPTION OF RAIN AND DEW BY THE GREEN PARTS OF PLANTS.

By the Rev. Prof. GEORGE HENSLOW, M.A., F.L.S., V.M.H.

Lecture delivered June 23, 1908.

1. INTRODUCTION.

THE subject of this paper was a matter of controversy for 150 years ; but it is hoped that at last the question whether moisture of any kind is absorbed or not by the aerial parts of plants will be set at rest for ever, and answered in the affirmative.

The many and varied experiments I have made, extending over some years, have convinced me that such is the case ; and they corroborate entirely the conclusions of M. Boussingault and other physiologists. M. Boussingault's researches proceeded simultaneously with my own, but were quite unknown to me until they appeared in the "*Annales de Chimie et de Physique*" (March 1878) ; and, while our conclusions were identical, our respective experiments really supplemented each other.

Hales, in 1781, and Bonnet, in 1753, alike *inferred*, but did not actually *prove*, that plants absorbed rain and dew.

In 1849 Garreau proved that the cuticle, instead of entirely resisting penetration by water, allowed it to pass inwards.

De Candolle, Meyen, Treviranus and others, however, objected to Bonnet's conclusions, asserting positively, but apparently without experimental evidence in support, that the leaves which he laid on the surface of water kept fresh for lengthened periods solely because transpiration was assumed to be arrested. Had they fixed watch-glasses on the surfaces of the leaves, as I did, transpiration would have been easily detected.

Notwithstanding these objectors, a general belief in the power of absorption seems to have been held until 1857, when M. Duchartre performed his experiments ; and although he had himself been previously of the opinion that if plants could not absorb vapour (which Boussingault has proved to be the case) they could at least imbibe dew and rain, yet he was led to abandon this view ; and he is responsible for the opposite one having been generally held by vegetable physiologists. It should be observed that practical horticulturists never abandoned the idea that plants can and do absorb water by their leaves.

As this change of view was somewhat of an obstruction to the progress of vegetable physiology, and, as far as I am aware, no serious attempt was made to refute Duchartre's conclusions, I propose showing how experiments proved them to be erroneous.

He commenced * his paper by objecting strongly to experimenters

* "*Recherches sur les rapports des plantes avec la rosée*," *Bull. de la Soc. Bot. de France*, t. iv. p. 940 ; "*Recherches expérimentales sur les rapports des plantes avec la rosée et les brouillards*," *Ann. des Sc. Nat.* 4^{me} sér. xv. p. 109.

using cut leaves or shoots instead of growing plants in their entirety; but he gave no grounds for raising this objection. On the other hand, it is easy to prove that all the functions of a leaf *are* carried on when detached as when growing: transpiration can be readily detected; and M. Garreau found in his experiments on respiration that "detached leaves gave the same results as those which remained attached to the plant;"* and if a green shoot be plunged into water the evolution of oxygen can readily be seen. Moreover, M. Duchartre compared a shoot to a detached limb of an animal, to which it is obviously not comparable; for there is no such mutual dependence between a shoot or a leaf and the main stem as in the case of an animal's limb. The one can be detached and made to strike root and grow into an independent plant; not so the other.

All that can be called injurious to a shoot, when detached for experimental purposes lasting for a short time only, is that the supply of water is cut off. And I maintain, making due allowance for that fact, whatever results a cut shoot or detached leaf gives in the matter of absorption and transpiration *are* legitimately applicable to a growing plant. Those who assert it to be otherwise must bear the burden of the proof.

M. Duchartre's experiments were made with plants growing in pots, the latter being carefully protected from imbibing any moisture by a mechanical contrivance. The plants thus prepared were weighed at 6 or 6.30 P.M., then exposed all night to dew. They were again weighed at 6 or 6.30 A.M. on the following morning, with the dew still upon them. The leaves were then carefully wiped one by one till the whole plant was dry. It was then again weighed; and the result was that the weight was almost exactly the same or more generally a little less than it was the evening before. Duchartre consequently came to the conclusion that in our climate dew is *not* absorbed directly by plants, but that it contributes to their nutrition indirectly only, (1) by reducing the nocturnal transpiration to nothing, and (2) by the intervention of the soil, which absorbs the dew.

The fundamental objection that I raise against his conclusion is that he has not considered the difference that exists between the statical or nearly statical conditions of the internal flow of water in a plant at night, with the dynamical or active flow ever taking place as soon as transpiration and evaporation are perfectly resumed in sunlight and heat.

He has shown it to be true, though not so absolutely as has been often asserted, that transpiration is greatly checked when the surfaces of the transpiring organs are thoroughly wetted, or when in darkness. Darkness and superficial moisture combined, as on a dewy night, must therefore reduce this vital act to a minimum. The internal flow upwards from the root, however, is not at the same time equally checked; for the temperature of the soil is not lowered to the same extent as that of the air.

Hence everything tends to bring the cells to as high a point of turgidity at night as possible. Under these conditions one would hardly expect dew to be imbibed in any appreciable quantity, *unless the leaves*

* "De la respiration chez les plantes," *Ann. des Sc. Nat.* 3^{me} sér. xv. p. 12 (1851).

and herbaceous stems were exceptionally flaccid at the beginning of the period of darkness.

Now Duchartre always weighed his plants early in the morning after this statical condition was fully attained; so that it is not at all surprising to find that he could not detect any increase of weight; hence his experiments seem to prove conclusively that at night dew is not usually absorbed in any appreciable degree.

Dew, however, does not disappear suddenly from leaves at sunrise; and it is only after sunlight and heat begin again to affect leaves that dew is actually absorbed. Herein, however, is involved a practical difficulty, for the balance will no longer help us. But I believe that as soon as transpiration recommences, then any part that may be the first to become dry will begin to transpire, and so cause an indraught of dew in any neighbouring spot where it may have been retained; so that there will be an influx and efflux accompanied by the usual root-supply, which probably furnishes the main source of water for transpiration. Hence it will be seen that it is generally impossible to detect the absorption of dew or rain by leaves with mathematical accuracy or to prove it to demonstration. On the other hand, the "proof" that such is the case may be arrived at indirectly by accumulating probabilities based upon observed facts. Such is the method I have attempted by aid of the following experiments.

The conclusion I have arrived at is that, while there is no objection that I know of which cannot be met, there are ample reasons for believing that dew and rain are, when absorption has been deficient, absorbed and utilised to supplement the normal root-supply.

2. EXPERIMENTS ILLUSTRATING THE POWER OF ABSORPTION OF WATER BY THE EPIDERMIS OF HERBACEOUS INTERNODES.

A shoot of first year's growth of elm had three internodes wrapped up in saturated blotting-paper on June 12. By the 15th the leaves were flaccid and nearly faded; but the terminal bud and a leaf adjacent to it remained quite fresh. By the 20th all four leaves were almost dead, with the exception of the bases of the blades. The terminal bud remained perfectly fresh until the 29th, when the whole was dead. Duration, seventeen days. A similar specimen not moistened totally perished in two days.

When herbaceous plants, especially those with tolerably large leaves, as *Borago officinalis*, *Rumex crispus*, *Sisymbrium Alliaria*, *Lychnis dioica*, &c., have only their internodes wrapped up in saturated blotting-paper, the leaves generally soon wither and perish, but the internodes remain green and fresh for long periods.

A branch of borage, having two internodes, was wrapped up on June 8. On the next day the leaves were much faded, but the stem was quite firm. On the 10th the upper part of the leaves was brown, brittle, and dead, but no change had taken place in the stem. By the 12th the leaves were entirely withered, excepting a small portion at their bases. On the 18th the leaves were quite dead. The internodes remained firm, green, and fresh. They thus continued until July 10. They then decayed slowly. Duration, five weeks and three days.

A similar specimen not wrapped up was perfectly dead in two days, the previously juicy stem being now dry and collapsed.

The long time during which the leaves remained green, of the first described of these specimens of borage, clearly proves that the supply of water must have been obtained through the epidermis of the internodes to balance the transpiration.

Symphoricarpus, or Snowberry.—A shoot had one internode wrapped up, with four leaves *beyond* it exposed. After three days the lower pair of leaves were dying, but the upper pair were fresh. After eight days all the leaves were dead; but the internode remained fresh several days longer.

A second and similar specimen had also four leaves exposed; but they were *below* the internode which was wrapped up. The order of decay was in this case reversed; the two lowermost or furthest from the wet internode died first, those nearest to it last.

The above are selected from a large number of experiments to illustrate the fact that herbaceous internodes readily absorb moisture in the endeavour to supply the leaves with water for transpiration, but that the demand is usually much greater than one or a few internodes can furnish: hence the leaves soon begin to die back from their apices to their bases. In addition to such supply as they can for a time give to the leaves, the experiments prove that moisture applied to internodes arrests death and decay in the stems and axillary buds for variously prolonged periods; for efforts to develop axillary buds were frequently made, as well as adventitious roots, these being apparently special instruments for absorbing superficial moisture.

8. ON THE ABSORPTION BY LEAVES ATTACHED TO BRANCHES, AND THEIR POWER OF NOURISHING THE REST OF THE LEAVES ON THE SHOOT.

On July 23 a shoot of hazel, with a sub-herbaceous stem, had three leaves lying with their *lower* surfaces only on water. The shoot bore two large and two small leaves sustained in the air. The whole shoot was perfectly fresh and vigorous at the end of a week. On August 3 the larger leaves began to die back from their apices, while the terminal small ones were dead. Hence it was far from entirely perishing after ten days.

A similar specimen had two large leaves with their *upper* surfaces only lying on water, the remaining leaves as before in air. Like the preceding, the whole kept perfectly fresh for the same time. The apical leaves began to die about August 3, or after ten days.

A similar specimen to these two, without water, was dead in two days, the leaves being brown and brittle.

Shoots of lime, elm, &c., treated as above gave similar results, showing that the presence or absence of stomata is immaterial, the upper surfaces of the above having none at all.

These experiments entirely corroborate the results of Hales, Bonnet, Baillon, Duchartre, Boussingault, &c., the general conclusion being that the duration of life in the specimen thus treated depends upon the supply

being equal to the demand. The absorbing-power is incontrovertible ; but the amount of foliage exposed varies the demand upon the power of imbibition.

To prove that the absorption and evaporation is not merely mechanical like a sponge, the following experiment will suffice. On June 10 a cut specimen of *Nepeta Glechoma* had two leaves wrapped up in saturated blotting-paper. One internode was exposed, bearing two other leaves also exposed to the air. By the 16th the latter were much discoloured. On the 22nd they were nearly dead ; but the buds in their axils had been developing, as well as smaller ones in the axils of the absorbing leaves. By the 27th both buds had borne four leaves each. One absorbing leaf was now dead. On July 10 the other absorbing leaf perished ; consequently the buds immediately died. Duration, four weeks and three days.

4. EXPERIMENTS TO SHOW THE POWER OF ABSORPTION BY LEAVES AND INTERNODES TO NOURISH LOWER LEAVES ON THE SAME SHOOT.

The possibility of an internode when wrapped up in saturated blotting-paper nourishing leaves below it has been shown in the case of *Symphoricarpos*. The following are instances in which the leaves alone or with the internodes did the same.

A frond of *Nephrodium Filix-Mas* had the terminal portion wrapped up on July 8. No sign of shrivelling occurred through an intensely hot month until August 22, when a few pinnules began to turn brown. Duration of observation, seven weeks.

The terminal leaflet of *Berberis Aquifolium*, as those of *Dahlia*, *Polemonium*, *Wistaria*, &c., all nourished the basal leaflets well for various lengths of time.

Veronica Chamaedrys, *Vinca major*, &c., all illustrated the same fact—that upper leaves can act as absorbents to supply lower ones on the same shoot, the lowermost leaves, *i.e.* those furthest from the absorbing ones, always dying first. *Vinca major* developed very vigorous axillary shoots from the axils of its absorbing leaves, similarly to the *Nepeta Glechoma* described above, the whole lasting six weeks.

5. ON THE NOURISHMENT OF ONE PART OF A LEAF BY THE ABSORPTION OF WATER IN ANOTHER PART.

The objection having been made by Duchartre that, when leaves are laid upon water so that the edges are not touching it, the absorption is merely *local*, and that water is not transmitted to the border, which consequently dries up, I have tried a large series of experiments, placing (1) the apex only, (2) the basal part, but not the cut end of the petiole, (3) the middle of the blade beneath the water. *Both* surfaces were immersed in every case. Again, I have taken the same parts, but placed (1) the upperside only, (2) the lower side only on water. The results gave every degree imaginable in the power of absorption. In some cases, *g. Ipomoea purpurea*, with the lower surface of the apical portion in water, the part in air rapidly perished, as this leaf is particularly thin.

In the majority of instances, however, it was at least two days, generally many more, before the edges were dead ; and in many cases they remained fresh for prolonged periods, even for weeks.

Nor is the result constant with the same kind of leaf. Some old lilac leaves had but feeble power to nourish the parts in air when the apical parts only were laid on water ; whereas leaves taken off the same shoot with the apical part completely immersed, or else with the middle part only in water, supplied the remaining parts sufficiently.

As a contrast to the leaf of the *Ipomoea* mentioned above, another leaf, placed with the upper surface of the apical half in water, nourished perfectly the basal part in air, as well as a long stalk.

Two leaves of borage were laid, one with the under surface, the other with the upper surface of the apical parts in water, but they could only nourish the mid-rib of the part in air ; the sides dried up as far as the rib.

Both the upper and under surfaces of *Digitalis purpurea* nourished the parts in air perfectly.

In this and other corrugated leaves the water runs into all the minute channels over the ribs and veins by capillary attraction, and thus irrigates the entire surface. Garreau has noticed how these channels, as well as the one very commonly occurring down the petiole, are particularly advantageous for absorbing water.

The conclusion I have arrived at is that the objection raised is really of no consequence. In the majority of instances it is some days before the margins dry up where the central part only is wet. Moreover, similar leaves not kept wet always perish far sooner altogether. This shows that even the leaves least capable of transmitting water laterally can do it to some extent ; if the leaves be thick it is easily effected ; and with corrugated surfaces the transmission is not only within, but without as well, so that the whole leaf becomes bathed with water, though the apex alone may be actually in it.

Now, when it is remembered that dew forms all over and on both sides of leaves, they are never in this artificial condition of being wetted only in part, at least at first ; but as the dew dries up in one part of a leaf and transpiration has recommenced in sunlight, the above experiments thoroughly establish the right to believe that an influx will be set up to balance the renewed efflux caused by transpiration.

6. ON THE POWER OF ABSORPTION BY DETACHED LEAVES LAID ON THE SURFACE OF WATER.

Of the preceding experiments, the results were solely judged of by the general appearance as presented to the eye. Such, however, clearly proved that leaves can readily act as absorbing organs in the absence of roots, not only so as to nourish themselves, but other leaves and buds on the same shoot, especially if the stem be herbaceous.

In the following experiments the leaves were left as stated below from July 30 to August 8. They were all carefully weighed to the 5,000th part of a gramme on the former date, then again at the latter. The losses are reduced to percentages of the original weight of the specimens respectively.

Plant	Proportional No. of Stomata	Surface on Water	Loss per Cent.	Apparent Condition
<i>Berberis Aquifolium</i> .	0	Upper	26.31	Fresh
" " .	50	Lower	13.38	Fresh
" " .	In air	—	49.10	Withered
<i>Ficus Carica</i> .	0	Upper	1.52	Fresh
" " .	100	Lower	5.23	Fresh
" " .	In air	—	73.95	Dry and brittle
<i>Ligustrum vulgare</i> .	0	Upper	7.93	Fresh
" " .	25	Lower	1.73	Fresh
" " .	In air	—	53.33	Flaccid
<i>Prunus Laurocerasus</i>	0	Upper	13.72	Fresh
" " .	20	Lower	4.51	Fresh
" " .	In air	—	21.39	Fresh
<i>Aucuba japonica</i> .	0	Upper	5.97	Fresh
" " .	50	Lower	9.82	Fresh
" " .	In air	—	27.84	Slightly puckered
<i>Hedera Helix</i> .	0	Upper	10.82	Fresh
" " .	45	Lower	16.64 (gain)	Fresh
" " .	In air	—	10.26	Fresh

These specimens illustrate the fact that, unless the difference be very pronounced, the eye cannot judge the amount of water a coriaceous, and even not always a herbaceous, leaf may have lost; secondly, that the loss is not entirely dependent upon, or proportional to, the relative number of stomata on the surface. In some cases, certainly the more often, there is less loss when the *lower* side is on the water; but even then this may not be referable to the stomata more than to a less cuticularised condition of the surface.

In the next series, in each case one specimen was partly plunged in water, the cut end (as in every experiment), as well as some leaves, were elevated in the air. They remained thus from July 30 to August 3. They were all weighed before and after the experiment, as before, in grammes to three places of decimals.

		Loss per Cent.	Apparent Condition
<i>Cedrus Deodara</i> .	Partly in water	.09	Fresh
" " .	In air	.57	Dry and deciduous
<i>Hedera Helix</i> .	2 leaves in water, 4 in air	10.28	Fresh
" " .	In air	10.26	Fresh
<i>Syringa vulgaris</i> .	4 leaves in water, 6 in air	3.11	Fresh
" " .	In air	67.20	Dead and crisp
<i>Thuja</i> , sp. .	Partly in water	6.19	Fresh
" " .	In air	21.97	Fresh
<i>Taxus baccata</i> .	Partly in water	4.52	Fresh
" " .	In air	23.92	Fresh
<i>Ilex aquifolia</i> .	Partly in water	1.84	Fresh
" " .	In air	13.33	Fresh

These examples, and many others, show clearly that the leaves in air on the branches which have other leaves in water are easily and well nourished by the latter. In the case of ivy but little difference is seen between the two percentages. This is due to the fact that, the transpiring surface of four leaves being greater than that of the absorbing, the supply was not equal to the demand.

The following specimens, weighed when gathered, were left without water for a day. They were then weighed again, their losses per cent. being given below. They were then partly immersed as before. They were once more weighed on the following day, after having been carefully dried.

<i>Corylus Avellana</i> , first loss per cent.	49.60,	subsequent gain per cent.	57.20
<i>Berberis Aquifolium</i> „ „	37.64	„ „	13.42
<i>Syringa vulgaris</i> „ „	35.70	„ „	18.80

In these three the foliage had faded to a considerable extent; consequently the gain per cent. is very large.

<i>Hedera Helix</i> , first loss per cent.	10.76,	subsequent loss per cent.	7.30
<i>Ilex aquifolia</i> „ „	13.93	„ „	9.04

In these two the transpiration exceeded the absorption; but the smaller loss after immersion, as compared with that before it, indicates that these coriaceous leaves had freely imbibed water.

<i>Buxus sempervirens</i> , first loss per cent.	23.95,	gain per cent.	6.10
<i>Aucuba japonica</i> „ „	17.28	„ „	4.58
<i>Prunus laurocerasus</i> „ „	22.35	„ „	12.12
<i>Prunus lusitanica</i> „ „	18.49	„ „	.36
<i>Thuja</i> , sp. „ „	14.93	„ „	6.84
<i>Cedrus Deodara</i> „ „	26.85	„ „	45.57
<i>Taxus baccata</i> „ „	20.92	„ „	25.46
<i>Viburnum Tinus</i> „ „	38.15	„ „	44.21

In these specimens the gain varies according to the amount of foliage exposed to the air, and the consequent loss by transpiration, all tending to establish the general conclusion that the retention of freshness visible to the eye, or the variable amount of loss or gain as proved by the balance, depends solely upon the respective conditions of "supply and demand."

7. ON THE ABSORPTION OF DEW.

In the following experiments the leaves were gathered between 4 and 5 o'clock in the afternoon of September 10. They were then exposed at an open window to the full light of the sun until it set. After two and a half hours the herbaceous leaves showed obvious signs of loss of water, having become more or less flaccid. The loss was not visible in the case of the coriaceous leaves. They were all weighed at 7 P.M. A bright moonlight night followed, and an exceedingly heavy dew began to form at 7 P.M. The specimens were all spread out upon a grass-plot. At 7 A.M. on the 11th, before the sun was visible, in consequence of a very heavy mist, the specimens were carefully dried with a soft cloth so as to remove all trace of dew with which they had been entirely covered. They were then weighed. In every case there was an actual gain, as seen in the following table. But, besides the proof afforded by the balance, the stems and leaves had perfectly recovered the freshness and rigidity which they had lost on the previous evening. It was quite impossible for the dew to have been absorbed by the cut ends of the stems.

	Gain per Cent.		Gain per Cent.
<i>Tilia</i>	16.40	<i>Viburnum</i>	6.84
<i>Quercus</i>	6.40	<i>Bryonia</i> (old leaf)	16.49
<i>Sambucus</i> (old leaf)	15.58	" " (young leaf)	10.31
" " (young leaf)	3.56	<i>Rubus</i>	14.28
<i>Geranium</i>	11.32	<i>Carduus</i>	10.71
<i>Urtica</i>	27.31	<i>Nepeta</i>	8.89
<i>Mercurialis</i>	14.50	<i>Malva</i>	9.09
<i>Tussilago</i>	31.56	<i>Ligustrum</i>	3.36
Grass	35.00	<i>Pulmonaria</i>	8.42
<i>Hyacinthus</i>	2.56	<i>Trifolium</i>	31.16
<i>Rumex</i>	16.66	<i>Syringa</i>	10.60
<i>Senecio</i>	8.44	<i>Tarax</i>	1.94
<i>Fagus</i>	24.05	<i>Berberis</i>	0.57
<i>Philadelphus</i>	8.33	<i>Aucuba</i> (young shoot)	2.20

8. ON THE ABSORPTION OF "IMITATION-DEW."

Finding that I could imitate dew very exactly by means of the "spray," I adopted this plan, so as to apply what I call "imitation-dew" to one, the upper or the under, surface of a leaf alone as required, or else to both surfaces at once, as it is in Nature.

A large series of very various and freshly gathered leaves was experimented upon, the general result entirely corroborating previous conclusions. The loss per cent. was almost invariably *less* when the *lower* side only was covered with dew, which shows that absorption of dew by *that* surface is more readily effected than by the upper. Such, too, was the case, it will be remembered, with water.

The certain inference that we may draw is that dew (in Nature) is absorbed from below to supply the transpiration from above, if the leaves are at all flaccid.

Another series of some forty specimens consisted of leaves which were left three hours to become flaccid. They were then weighed; the loss per cent. from the original weight when freshly gathered was calculated. They were then treated with imitation-dew, there being three examples of each species; one had dew on the upper surface, another on the lower, the third on both sides. In more than half of them they *gained* weight after having been left to dry: the remainder had lost a very small fraction per cent. This was due to the fact that they had become quite dry some time before being reweighed; hence they had again begun to lose weight once more by transpiration.

Hence this experiment entirely corroborated the one mentioned above of the absorption of actual dew by slightly wilted leaves.

9. ON THE NOURISHMENT OF PLANTS ROOTED IN POTS BY AID OF THEIR LEAVES AND GREEN INTERNODES ALONE.

A small healthy plant of *Mimulus moschatus* bearing three shoots was growing in a pot. I ceased to water it on June 4. By the 8th the shoots showed signs of wilting; so I now placed the apices of two shoots only in water. On the 11th the leaves on the third and exposed shoot had all withered; but the small buds in the axils of the lowest pair of

leaves but one remained vigorous, being about half an inch long. The smaller buds, a quarter of an inch long, were in the axils of the next pair of leaves. Lastly, the terminal bud and pair of leaves were quite fresh and green.

On the two stems which had their apices in water, the lowest leaves (in air) were more or less withered by July 2. The apex of the shoot in air and all its buds were now beginning to grow vigorously. Three blossoms were borne and expanded on these shoots with their apices only in water.

By July 7 a great quantity of adventitious roots had made their appearance from the nodes in water.

This musk-plant thus grew slowly, but well for more than a month; and on removing it from the perfectly dry soil several subterranean buds were pushing vigorously.

One learns also from this experiment, as from previous ones, that it is immaterial to a plant which way the water may flow; for it was *downwards* in the shoots with their apices in water, but of course upwards in the shoot in air.

A similar plant left without water on the same day (June 4) became flaccid in two days, and perished utterly in two or three more.

Other plants, such as *Lysimachia Nummularia*, &c., gave similar results.

10. ON THE ADVANTAGES OF SYRINGING PLANTS IN A GREENHOUSE.

This is, of course, a universal practice; but if the roots were the solely possible absorbing organs, as has been supposed, why do not gardeners confine the water to the roots? According to M. Duchartre, one would infer that Nature only rains upon plants and deposits dew upon herbs solely because it cannot be helped, but with no direct benefit to vegetation. But it would seem that, by syringing, practical experience has forestalled the scientific rationale. Gardeners have all along believed in its efficacy, though they may not have "proved" the actual leaf absorption. The physiological experiments of Hales, Bonnet, and others, down to those of Boussingault and myself, have now, it is hoped, given a complete proof of this fact; and we may thus sum up the advantages of syringing:—It keeps the leaves clean from dust, and helps to wash off insects. It moistens the cuticle, and so perhaps renders it more pervious to carbon dioxide (*Barthélemy*). It also renders it more capable of absorbing water (*Garreau*). It checks the loss by transpiration (*Duchartre*), and so enables the terminal shoots and young leaves of a plant to be well supplied with sap by drawing upon the reserve fluid in the stem. It keeps the air cool by evaporation; and, lastly, it may be actually imbibed by the leaves and green parts of plants, and so help to compensate for any loss from within the plant, and thus supplement root-absorption.

What is true for syringing is, of course, equally true for rain.

11. ON THE PRESERVATION OF CUT FLOWERS.

Sachs, in his "Text-book of Botany," quotes the results obtained by Dr. Hugo de Vries on the withering of plants as follows :—*

"If rapidly growing shoots of large-leaved plants are cut off at their lower part which has become completely lignified, and are placed with the cut surface in water, they remain for some time perfectly fresh. But if they are cut through at the younger parts of the stem and are then placed in water, they soon begin to wither, and the more rapidly and completely, the younger and less lignified the part where the section is made. This withering can be easily prevented by making the section under water, and taking care that the cut surface does not come into contact with the air, the conduction of the water through the stem then suffering no interruption. If care is taken that while the section is being made in the air [especially with a *wet* knife], the leaves and upper parts of the stem lose only a very small quantity of water by evaporation, withering does not begin till later, and increases only slowly after the cut surface is placed in water, and the leaves again transpire."

The cause of withering, Sachs then observes, is the interruption in the conduction of water from below. This agrees with Prillieux's observations,† that as soon as transpiration was checked in a faded shoot by placing it in a humid atmosphere, the water held in reserve in the stalk was drawn upon, and the shoot recovered. Similarly, Duchartre shows that withering results from one of two causes—either that the soil may not contain sufficient moisture to balance the loss by transpiration ; or else the latter may proceed more rapidly than the water can be passed up the stem to keep pace with it, and so fail to retain the tissues in their normal state of turgescence.

Sachs and other observers, however, all allude to the cut end as *alone* being the place by which water is absorbed ; and, as its conductivity is rapidly impaired by exposure to air, it is recommended that a sufficiently long piece of the stem should be removed by a new cut above the first, but this time *beneath the surface of the water*. For a shoot about 8 inches long, 2 or 2½ inches should be cut off.

Now Bonnet's experiments and my own clearly show that absorption can take place through the surface of herbaceous stems and by leaves as well as the cut ends. This fact led me to presume that it would be judicious to retain one or more leaves upon a flower-stalk, as well as to allow the stalk itself to be of considerable length, if the inflorescence was to be retained without withering as long as possible.

It was found, however, that if the flowers are well nigh at maturity, the additional impetus given to them by the extra absorbing surface hastened them too much, so that the petals would fall early ; but, on the other hand, when the stem was ligneous, as of lilac, or the inflorescence chiefly in buds, as of *Tradescantia* and *Compositae*, then the advantage was apparent ; so that, instead of the buds perishing, they continued to expand successively.

A certain amount of judgment would, therefore, seem to be necessary in forming a bouquet as to the desirability of retaining some leaves or not ; but if the principle be understood that it is a question of "supply

* P. 806, Eng. ed.

† "Expériences sur la fanaison des Plantes," *Comptes Rendus*, t. lxxi. p. 80, 1870.
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and demand," it will not be found difficult to discover to what extent it may be desirable to increase the absorbing surface in each case.

It is hardly needful to remark that the leaf must be in full vigour, and, if it show any signs of decay, must be instantly removed. Moreover, the leaves are apt, apparently through endosmotic action, to be after a time often coated with a kind of mucus, so that the water must be changed more often than when stalks only are inserted.

M. G. Weidenberg * believes that the reason of the frequent fading of cuttings before they have struck root is to be accounted for by the fact that, as a rule, the transpiration from the exposed leaves is greater than the amount of water which the cut end can supply. He recommends, therefore, that the cuttings should be longer than usual, and that some of the leaves should be buried as well, so that about one-third of them may remain above ground. Those leaves in the soil will thus undertake the function of absorbing water. The ground (he adds) should be porous, to allow of free access of air, so that the roots may be formed rapidly before the leaves have time to decay. In this way roses, pinks, and other cuttings, usually hard to strike, will make very good roots.

* *St. Petersburger Zeitung* (Beiblatt), February 20, 1879.

ANNUAL FLOWERS.

By ALFRED WATKINS, F.R.H.S.

[Lecture delivered July 21, 1908.]

No doubt, among the readers of my paper will be many experts and a few amateurs, of whom some are probably more or less experts in various departments of floriculture.

It is not so much these, who probably know the annual flowers almost as well as the Roses, Orchids, and florists' flowers, as it is the small



FIG. 26.—TAGETES SIGNATA FUMILA ON LEFT; VAR. 'GOLDENGEM' ON RIGHT.

amateur gardener who keeps only one gardener or who cultivates his garden himself, whom I wish to impress with the great beauty and capabilities of many of our present-day annuals *when properly grown*.

I will divide my paper into three parts. I shall give, first, my idea of the proper cultural treatment of annuals generally; secondly, a few facts regarding the enormous increase in the number of kinds, and especially in the variety of colours and improvements in habit of the different plants available now as compared with years ago; and, thirdly, a short sketch of how by careful and constant selection these results have been brought about.

Annuals are really quite as useful in large gardens as in small ones, for a long succession of bloom can be obtained from many of them.

Some are more suitable for large beds and borders, others for small beds ; some for carpet bedding, others for cut bloom ; some bloom in spring, some in summer, and some in autumn ; many are more fit for greenhouses and growing in pots ; some grow 8 feet to 10 feet in height, some only 6 inches or less ; some are hardy, some are not.

Annuals, however, are, I fear, despised by many people, partly because they are not properly known, and more often because they are most improperly and negligently grown. The ordinary amateur is generally, or at any rate often, a relentless murderer of annuals. He buys a few or many packets of seed as the case may be, sows them *very* thickly in *little* clumps, puts a cleft stick in the centre of each clump with a little paper flag in the cleft bearing the name, and thinks that is all that is necessary, or that Nature or chance will do the rest. A packet of seed, whether it contains many or few, must be all crammed into this one little clump or patch instead of making two or three or more. Consequently the plants struggle for a time for bare existence in tightly packed masses of fifty or a hundred, where there should have been but two, three, or four plants at most. Poor wretched annuals ! Disease and death come prematurely to nearly all, probably all, though perhaps a few continue to struggle on and eventually bloom. But *what* a bloom ! What a plant ! bearing scarcely any resemblance to its real natural beauty—sans form, sans habit, sans size, sans everything that would have made it beautiful and attractive.

If, however, they had been sown by anyone with experience or even common sense, in a spare part of the garden *thinly*, so that the seedlings when just above ground had been $\frac{1}{2}$ inch or 2 inches apart, according to kind, of course, and then, as they grew on, if at all crowded, thinned out, and when large enough to handle, transplanted to where they are to remain and flower, they would have grown into good plants and developed in all their beauty of habit, form, and size. I can think of no annual that requires less than 6 inches to 8 inches of space to grow and develop in, except perhaps the little Virginian Stock or Nemophila, which might put up with, say, 4 inches, but, of course, large-growing plants, such as Sunflowers, Antirrhinums, and tall Larkspurs, should be much further apart even than 6 to 8 inches. These require from 1 foot to 2 or even 3 feet. Some few annuals do not like transplanting, and should be sown where they are required to bloom, of course *thinly* ; when up they should be thinned out *early*, not waiting till they begin to suffer acutely from overcrowding. Such are Poppies of all sorts, Eschscholtzias, and all those with long tap-roots.

I have spoken so far respecting annuals which are better sown out in the open, but many, a great many, are better sown in pots or flat boxes under cold frames, and some under frames in a little heat in January or February, *thinly*, always *thinly* ; then, when large enough to handle, pricked off into other flat boxes, 2 to 4 inches apart, and grown on in these in cold frames until April or May, or in some cases June, then planted out of doors into their flowering quarters. Among plants best treated in this way are Asters, Stocks, Antirrhinums, Ageratums, Verbenas, Balsams, Marguerite Carnation—that is, the annual one—Heliotrope, Marigolds, Dahlias, &c.

When annuals are grown under really proper and sensible or suitable conditions, a garden may be made very gay in spring, summer, and autumn with them; but annuals have not generally been overburdened with care and attention—so many people simply sow them and then neglect them



FIG. 27.—PANSY—OLD AND NEW FORMS

entirely and think they will grow anywhere and anyhow. If they were only planted out, or given as much room as are Lobelias, Geraniums, Begonias, Cannas, Dahlias, and other plants for which high prices are paid the annuals which cost so little would do as well.

Then annuals have to be known and understood just as other plants, and grown in proper and suitable places to give proper effect. It would be unwise to grow the tall Larkspurs or the tall Antirrhinums or the tall *Clarkia elegans* in small beds, and useless to grow the dwarf Virginian Stock or the dwarf *Tagetes signata pumila* for tall effects at the back of long borders. I would suggest that varieties that are not known by the gardener sufficiently as to their habit and usefulness, should be grown in the vegetable garden or some more or less out-of-the-way place the first year—not under trees, of course—where one can study them and their habits in order to know better another year how properly to utilize them. Plants so grown need not be wasted, for they will provide cut flowers for the house.

I will now explain what I understand an “annual” to be.

The best definition, I think, is a plant which, if the seed be sown in spring, will bloom the same summer and will ripen its seeds in autumn. These may be called true annuals.

There are many plants which are really perennials, but which may be used as annuals, even in this country with our short summer. Such are Pansies, Violas, Pentstemons, Verbenas, Antirrhinums, Dahlias, &c. These when sown in a little heat in early spring will bloom in summer and autumn, and are very suitable and useful for keeping up the summer and autumn display.

Annual flowers have been enormously improved and increased in number of varieties and in variety of colours, and in many kinds the habit has been vastly improved, during the last thirty to fifty years, and more particularly during the last ten to twenty years. I certainly think they have been improved as much as Roses, Dahlias, and florists' flowers generally. In the year 1851, a wholesale seed catalogue, which I have been kindly allowed to see, and which I should say was at that time the leading one, contained 760 varieties of flower seeds. To-day my firm's wholesale catalogue contains 2,920 varieties. Of that popular annual, the Sweet Pea, thirty years ago there were but five varieties listed, not one of which was of a blue shade; now there are probably over 200 varieties. There was then but one class as regards habit; now there are the very dwarf or Cupid, the semi-tall or bush, the ordinary tall, and the early flowering, sometimes called Christmas-flowering or Telemny.

So it has been with most of our other annuals—improvement and selection have been going on apace.

I, and many more, have been doing our best, according to our lights, as far as Nature would allow us, to continually improve by selection the many varieties, not only, of course, of annuals, but of perennials. The Rev. W. Wilks, the competent and energetic secretary of this Society, obtained from the common Field Poppy one of the most charming and popular additions to our seed lists, the Shirley Poppies. They are variations from the Field Poppy, with white base to the flower and yellow stamens, and they have varied into many shades of pink, apricot, orange, scarlet, and almost crimson, either self colours, or white edged with one of those colours, or one of those colours edged with white. All plants blooming with a black base and stamens (these show the tendency to revert to the wild state) should be rigorously pulled up, for 5 per cent. of

these rogues left in this year for seeding would represent 15 to 20 per cent. in the progeny next year.

When growing a large bed of anything one sees a slight variation, or sometimes a great variation, for the better, as one thinks, in one plant. It is marked in some way, generally by placing a stick against it, and the seed of this selected plant is saved separately, and grown on the following year. Possibly one finds the plants from this selection come 50 per cent. true, possibly 20 per cent., possibly 10 per cent.; not infrequently one finds not even one plant like the plant the seed was saved from. If one finds 50 or 20 per cent. true to the original, it means pulling up and throwing away all that are not true, and continuing this performance for three or four and often five or six following seasons before one attains one's object in getting a fixity of type; and perhaps during those three,

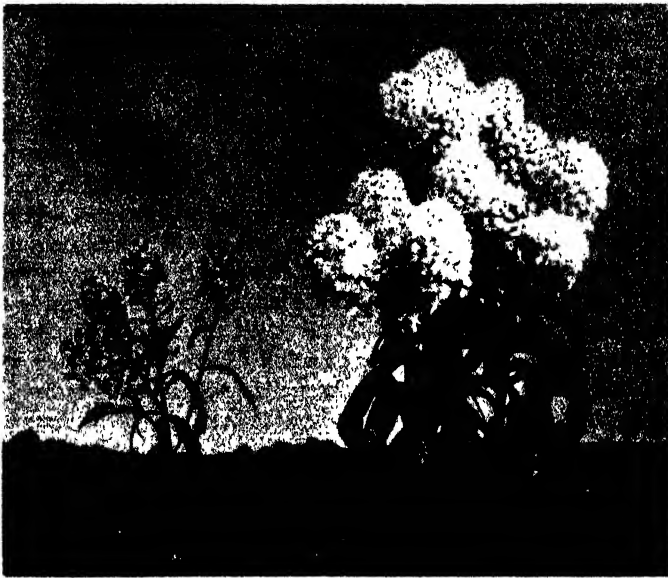


FIG. 28.—CANDYTUFT—old form on left; 'HYACINTH-FLOWERED' on right.

four, or six years of selecting and fixing, one season is a very bad one, as we not infrequently get in this country, and you get no seed at all from your labours—these are some of the disappointments one has to face. I once, some years ago, selected one plant, a very much improved culinary pea, a very fine podded Telegraph Pea, out of a great number of Telegraph Pea plants; in five years after the first year—*i.e.* six years in all—I had succeeded in having grown from this, 100 bushels of seed. These had been threshed, cleaned, and put into sacks in the grower's barn. That very night there was a fire, which burnt down the barn and all my 100 bushels of peas. So it often is with selections: there are many disappointments in addition to the care and trouble required in selecting and increasing these new and improved varieties of flowers and vegetables, and it is therefore very costly work, much more costly than is often thought.

No plant comes absolutely true from seed, everything varies somewhat. You go into a field of cabbages or into a field of poppies. At first sight or at a casual glance they do look to be the same, but after careful examination you will find no two plants *really alike*.

I have noticed in some plants of annual or other flowers when selecting for compactness of habit, which, I must own, has often been one of my aims, another unlooked-for good quality developing in my selections—namely, intensity of colour. Some years ago I started selecting the *Eschscholtzias*. The old varieties are very rambling in their habit, take up a lot of room and are not very free-flowering. I began to look out for those showing more compactness and erectness of habit, and after selecting this way for some years, and improving the habit each year, I succeeded in fixing what I named the ‘*Erecta Compacta*’ class. I selected this ‘*Erecta Compacta*’ habit both out of the old ‘*Mandarin*’ and the old ‘*Carminea rosea*,’ and in the course of doing so, I found as I selected the more erect and compact plants each year, I also got much greater depth of colour in the flowers, and to-day the *Eschscholtzia* ‘*Mandarin Erecta Compacta*’ which I introduced is far deeper and richer in colour than the old ‘*Mandarin*,’ as well as being of far better habit for a garden, more erect, more compact, far more free-flowering, and my ‘*Intus roseus compacta*’ or Carter’s ‘*Carmine King*,’ produced in the same way, is not only *more* erect, compact, and free-blooming, but much more intense in colour than the old ‘*Carminea rosea*’; it is a rich carmine rose, but has the same colour inside the flower as outside. In the old ‘*Carminea rosea*,’ the pale rose colour was and is only on the outside of the petals—inside, the petals are creamy white, so that the flower looks a rose colour only on a dull day or in the evening when it is closed; on a sunny day it looks white, because one sees only the inside of the flower. To have the flower the same rich deep colour both inside and out is a great advantage, and this we have in ‘*Intus roseus*.’ Strange to say, in 1904 I had fixed this and it was introduced to commerce in the spring of 1905; the following year the same thing was brought out by Mr. Burbank in America, under the name of ‘*Burbank’s Crimson Eschscholtzia*,’ and by Messrs. Carter as ‘*Carmine King*,’ so no doubt we had all three been working on the same lines, only I was one year in front of the others. It had taken me about seven years to select and fix it. Then, again, out of this we have selected a very different and distinct colour with the same habit. One we introduced last season, called ‘*Erecta Compacta Dainty Queen*,’ has pretty shell-pink flowers.

In *Godetias* the same thing has happened with me. The old varieties of *Godetia* of years ago were all tall, straggling plants, and undecided in colour, like the old ‘*Rubicunda splendens*.’ To-day we have the dwarf, compact, massive blooming, and intensely rich-coloured ‘*Sunset*’ and ‘*Crimson Glow*,’ but many years of patient selecting have been required. ‘*Sunset*’ I introduced four years ago; ‘*Crimson Glow*,’ a deeper colour, last year.

I have found it advantageous in my selecting, generally speaking, and more particularly with these *Eschscholtzias*, *Godetias*, &c., to pick out the *one* best plant amongst the many growing, and to save seed from that to

go on with the next year instead of picking out several: one may see many nearly as good, or perhaps quite, in a batch of seedlings, but I found that when I kept to one only, I started then at any rate with less mixture of blood. It takes, however, a longer time to secure a large stock of a strain by this selection of one, but it entails less labour in selection for the next three or four years, and the final result is more satisfactory and lasting; the improvements or novelties which I have introduced from time to time have been, I flatter myself, far more fixed in character in consequence, than the generality of new selections.

There are many more kinds of annuals which have been improved either in habit or colour or both, or in which new colours have appeared, or sometimes a variegation of leaf has shown itself, as in the *Nasturtiums*.



FIG. 29.—*NEMESIA STRUMOSA* BUTTONI AND VAR. *COMPACTA*.

Some few years ago I introduced the *Nasturtium* 'Queen of the Tom Thumbs,' a variety with very variegated white and green leaves. This took me six years to fix in character, starting with one plant only, which appeared in some thousands of plants of 'Lilliput,' and at the end of that time I had only four pounds of seed to put into commerce; it is a very shy seeder. The first year half the plants came green leaved, half variegated; the next year about 80 per cent. were green leaved, the next year about 20 per cent., the next about 10 per cent. only. To-day it keeps true to the variegated type, with the exception of perhaps 5 per cent. green. It had dark maroon-crimson flowers, and was a most striking variation in the *Nasturtium*; no variegated-leaved form had before been seen. Now to-day we are getting many more colours of the same variegated-leaved or 'Queen of Tom Thumb' *Nasturtium*, and also

a tall or climbing section with similar variegation, called 'Queen of the Talls.'

I may say that I have done but little in artificial hybridizing. I have always preferred looking out for natural breaks or variations and spotting those I considered improvements or likely by careful selection to lead to such; I have generally considered them more easy to fix in character than those produced by artificial hybridization. Every plant from seed varies in some degree from the parent form; some going, as one may say backward, some forward, but all varying somewhat; and it is from these variations that I have generally attempted to select. Cross-pollination is doubtless very frequently effected by insects; while sometimes, no doubt, the variations are caused by the surroundings and soil and Nature's desire to go forward and improve itself; but man is seldom so wise in his selection of parents as Nature.

Some classes of plants vary in variation, if I may say so, more than others, and some crosses or hybrids differ very considerably in their variability from others, even in the same family. The Sweet Pea, for instance, had not been known to sport much before the 'Countess Spencer' variety was born. Mr. Eckford's new varieties always were introduced to the world true and fixed, but when this variety, 'Countess Spencer,' first came out it sported into anything and everything; and this was perhaps a good thing, as we have, or expect to have some day, a grand lot of new colours fixed from it; but now all, or nearly all, are as bad as their parent, the 'Countess.' Growers select these new colours of 'Countess' type and try to fix them and think they have succeeded, but so far, even if selected perfectly true the first year, one finds them gone all to pieces the next, with only a moderate percentage of the true type and colour in them, often hardly any. How is it? What law governs it? I do not know the law, but I know the fact. But quite different is it with the 'Gladys Unwin' type, which is a very similar cross, almost identical in colour, size, and appearance, but so different in its variability, for it keeps perfectly true, and I am proud that my firm introduced it. Then all its progeny—'Nora Unwin' (the white), 'E. I. Castle' (the carmine, shaded orange), 'Mrs. Alfred Watkins' (the pale pink), all keep true. There may be a very small percentage of stray ones, but these are hardly worth mentioning, and there is no difficulty at all in keeping them quite true.

As the 'Countess' has now, after five years' constant and ruthless selection and care, been at last really fixed, I am hoping that with the same constant care and ruthless selection its progeny may also before long be fixed in character.

I have come to the conclusion that when once any cross or hybrid behaves like the 'Countess' Sweet Pea, it proves it has come upon a period of great variability in the history of the race, and this power to vary remains active for several generations. I have noticed white-seeded runner beans sown and produce a percentage of scarlet runners, and these produce and ripen dark seeds. I have sown dark-seeded scarlet runners and seen a percentage of white-blooming ones grow from them, producing white seed. So with the 'White Spencer' Sweet Peas, introduced from America last year. We sowed them (every seed was *white*), but they have shown 5 to 8 per cent. of plants with flowers not white, but

coloured, and of various colours, and I am quite sure the seeds of these plants will be dark, not white, as the seed was from which they grew.* The same thing occurred with the 'Primrose Spencer,' introduced also from America, and both had 40 to 50 per cent. of hooded flowers in addition. This shows that the Spencer type so far is sporting quite as much in America as in England. It is curious, not to say mysterious,



FIG. 30.—*AMARANTHUS CAUDATUS*—OLD AND SELECTED FORMS.

and so far I do not understand it; one cannot discover the colour nor the germ of colour in the white seed, nor the whiteness in the coloured seed, nor, I am sorry to say, the cause of it, otherwise it could be prevented and guarded against.

* Since this was written the opportunity for examining the seeds of these plants with coloured flowers has occurred, and all are found to have produced coloured or dark seeds.

There are many perennials and biennials that are now throwing or sporting into annuals—that is, occasionally producing plants that have an annual existence and bloom the first year from seed, instead of the second ; these are being noticed and selected out for fixing, such as the annual Sweet William, no doubt a cross between an annual *Dianthus* and some late blooms of the old perennial Sweet William. These have a habit similar to the annual *Dianthus*, but the flowers and leaf of the old Sweet William. • There is also an annual Hollyhock, one that, if sown in heat in February and grown on well, will bloom the same summer, whereas the ordinary Hollyhock, if sown however early in 1908, will not bloom until June or July 1909 ; and the annual Wallflowers, which bloom from June to the frost, if sown in February in slight heat and grown on. I introduced the *annual* blood-red Wallflower about ten years ago, and to-day there are four other colours—five in all—all of which I have introduced very recently. With these annual varieties and the old biennial ones, Wallflowers may be had in bloom in the garden nearly all the year round.

DESSERT CHERRIES IN POTS.

By JAMES HUDSON, V.M.H.

(Lecture delivered August 18, 1908.)

It cannot be said that the cultivation of cherries upon walls in the open air is in the majority of gardens a great success. With the exception of apricots probably more cherry trees are failures than is the case with any other fruit. True, the soil is not always what it should be in order to obtain the best results; but, on the other hand, the mode of treatment is frequently not upon quite such rational lines as it should be. Let the stock upon which the dessert cherry is worked be what it may, it has a tendency to foster luxurious growth if not carefully attended to. This difficulty in cherry cultivation in the same way handicaps the grower when the trees are grown under glass if the borders be not thoroughly well prepared at the onset.

Whether the borders are outside or inside, the contingency to be guarded against is a too luxurious growth, which, if checked by the use of the knife, results in cankered branches. Luxuriousness of growth is often the result of planting in too rich a soil, such, for instance, as one in which farmyard or stable manure has been freely used. It is better in almost every kind of soil to depend upon good loam with lime or mortar rubble, or upon an artificial compound in which both phosphates and potash play an important part. In the open upon walls the horizontal rather than the fan system of training is the best. I have followed this system myself and proved its great value, for I find it easier to control the growth than when dealing with the fan-trained tree; consequently there has been less use of the knife and more use made of finger and thumb pinching. But it is not always easy to obtain suitable trees from the nurseryman.

On account of these difficulties and failures this paper advocating the cultivation of cherries in pots has been written.

This system of pot culture was adopted by the Messrs. Rivers of Sawbridgeworth many years ago, and to them more than to any other growers belongs the credit of its striking success. They have clearly demonstrated by their repeated exhibits and by the wide and successful use of the method in their own nurseries what can in a fairly easy manner be achieved. Failures may occur, as they do, but one should never think that he can grow fruit trees in pots under the shade of other trees. This is beyond all reasonable expectation.

It is not necessary to have recourse to glass for the cultivation of cherries in pots, but I most strongly recommend it. If not under glass, then most certainly the trees should be fenced in, to guard against the depredations of birds. Cherries in pots when grown in the open should be plunged to the rim, with two or three bricks under the pots, to keep the drainage clear.

It may be urged that the labour of watering would be a serious item; not so much, may I say, as one would surmise. It would be an excellent practice for our young gardeners to have a little careful training in watering. There is far too much of what might be termed slopping in its place at present, and water is given either in excess or at the other extreme. To be trained to exercise caution in respect of this important operation would be productive of good. When grown under glass it is not advisable to plunge the pots at all, but rather to depend upon sounding the pots as to the requirements of the plants. With a little practice and observation it will be found a comparatively easy matter to manage the watering.

When the fruit is seen to be freely swelling it is well to apply a stimulating manure; in fact, a mixture of chemical manure, such as has been already alluded to, may be safely applied as soon as the fruit is set; but it must be in very small quantity indeed, a mere dusting of the soil. This may be repeated three or four times during the swelling of the fruit. At intervals a weak solution from the farmyard manure may be applied. This will foster leaf development for another season. As soon as it is seen—by the amount of water that the trees require—that some top-dressing would be beneficial, it is a good plan to make up a mixture of good turfy loam, a little lime rubble, and either hop manure or some stable manure that is well spent. This should be applied as a top-dressing around the sides of the pots, and may be raised to a height of two inches above the pots, being pressed down firmly. Into this the roots will soon find their way and add to the vigour of the tree and the size of the fruits. When the fruit is all picked in every instance give one or two applications of the chemical manure mixture, so that its constituents may be assimilated by the tree for the ensuing season. In dealing with artificially compounded stimulants that are of a genuine character it is most essential to guard against any excessive use. Many err in this and defeat their own good intentions by too frequent applications or by using too much at a time.

Potting should be done during the late autumn—say, by the end of October, or even later if the foliage is not well ripened. I have frequently been asked if we repot our trees every year. My reply is, “Yes, we do, unless it be in the case of a tree that has not borne any fruit.” Such a tree does not usually require to be potted, but may stand over for one season. We use a claw-scratcher with which to reduce the balls sufficiently to allow the trees to be replaced in the same pots, unless it be in the case of a tree which is particularly vigorous, when a size larger of pot is used. We guard against employing pots of large size. I think we have no pots in use measuring more than 14 inches in diameter. If I were growing in pots cherries that are not forced I might use larger pots—say, up to 18 inches—but nothing larger than that. In potting the soil is rammed firmly and well; it is work that cannot be rushed through in a hurry. Should the ball of any tree be found to be dry it is well soaked prior to potting. After potting one or two good waterings are given and occasional syringings when the weather is fine and dry. The wood must be kept from any indication of shrivelling, and the last of the leaves ought to be preserved for a little time, if possible. The soil itself should be mixed a few weeks in

advance of the potting, being stored in a dry place, away from the influence of autumnal rains. This is all-important; otherwise it does not handle so well in the potting, being made pasty in the process of ramming. It is almost superfluous to say that the pots should be clean and well-seasoned. The drainage should be of a like description too.

The soil best suited for the cultivation of cherries in pots is a strong loam; the top spit of an old pasture of a fibrous character will suit well. A calcareous loam is much to be preferred to a sandy loam. A good example of what I mean is the loam obtained in the neighbourhood of Kettering; this we use with another loam from Surrey that is rather lighter and rather more fibrous; the two combined make a good mixture. To this we add a sufficient quantity of old mortar rubble for its presence to be noticed in the soil. A small amount of well-decayed manure, worked through a sieve, is used to foster root action. Failing old mortar rubble I would use well-pulverized oyster shells. After potting, as our trees are all intended for forcing, we store them close together in a cold house. If not forced it is not really essential to do this, but in that case the pots should be plunged in ashes to guard against frost. The attacks of birds have also to be considered and guarded against when the trees are out of doors.

The most troublesome pest that I have had to deal with is the black aphid; this, if not taken in time, will soon disfigure the foliage and deposit filth upon the fruit. A small caterpillar is, under glass, rather troublesome if not taken in time. It knits the leaves together and also injures the fruit. Red spider has to be guarded against also, but it is not so generally to be feared. A winter dressing of alkali wash serves a good purpose during the dormant stage. Before growth has commenced a fumigation should be given, and again before the flowers expand. The syringe will keep down the red spider, but it may be necessary to repeat the fumigation if there be any signs of the caterpillar.

Under pot treatment pruning is very limited. Generally speaking more can be accomplished by pinching the shoots during the earlier stages of growth than by later pruning. What has to be aimed at is the development of the fruit-bearing spurs and the basal flower-buds of the longer shoots. Extension in the case of a vigorous tree should also be allowed, but in a uniform manner, so as to balance the growth. Canker very rarely occurs; one is not absolutely free from it, but it cannot be said to cause much anxiety.

More than thirty years ago I used often to admire the handsome fruits of black Tartarian that used to be shown, during May generally, by the late Mr. Geo. Miles, of Wycombe Abbey Gardens. These, I think, were from a trained tree. It is, however, much better to adopt the pot system for early forcing and to depend upon planted-out trees for the second early crops. Our trees are all in pots and, with an average season, the first fruits are ripe by the first week in May. A fortnight may be gained, but the gain in time is not commensurate with the attendant risk. Early spring fogs and dull, sunless weather have to be considered and guarded against, whilst the cherry is also most impatient of fire heat. Our practice is to commence syringing the trees by the middle of January, closing for a time afterwards, but always allowing air

to be on all night. We never close absolutely unless it be excessively cold. With a slight warmth in the pipes and a little top air I am satisfied if the thermometer does not fall below 85° by morning. When in flower the same precautions must be exercised; for it is fatal to the setting of the fruit if a high temperature be maintained. Even as high as that for peaches and nectarines is too high for cherries. For the purpose of securing a good set of fruit I now always employ a hive of bees; by this means a failure very rarely occurs. In fact, we have, in nearly every case, to thin the fruit with a pair of grape scissors as soon as we can detect the best and strongest. Thinning later on is attended to, so that no tree is overtaxed. As soon as the earliest variety, 'Guigne d'Annonay,' is showing colour, we place a few trees in a peach and nectarine house to hasten them on, and thus secure a gain in ripening by nearly a week. Our crop of cherries in pots usually lasts from the first week in May until the first fruits on the open wall are ripe—say, for six weeks. With the exception of grapes there is not, I think, any kind of fruit that will last fresh and fit for the table for so long a period as the cherry—i.e. upon the tree itself. When all of the fruits are picked the trees are stood outside, being plunged over the rims in a partially shaded spot and a slight sprinkling of artificial manure given. Due attention is paid to watering during the summer, and by the autumn quite a mass of roots have taken hold of the top-dressing and the surrounding soil, as may be noticed when the trees are lifted for potting.

From close observation, extending over some years now, I have come to the conclusion that the following eight varieties are best suited for forcing purposes.

Guigne d'Annonay (black).—This is earlier than 'Early Rivers' by ten days. The fruit is small, but very sweet when black, being also a good cropper. It is fit to use when dark red in colour.

Early Rivers (black).—This is the finest cherry in cultivation for general forcing purposes; it is of large size, very prolific, and of good constitution. It is a most handsome fruit, too, when placed upon a dish, and of fine flavour.

Bigarreau de Schreken (black).—A fine cherry, firmer than the preceding, a good bearer, very large indeed, a noble fruit, firm in texture, and of excellent flavour.

Governor Wood (white).—An American cherry, very prolific and handsome, also of first-rate flavour. It is what may be termed a white cherry, having a rosy tint on the sunny side. The skin is thin, hence it does not travel so well.

Frogmore Early Bigarreau (white).—This is the finest white cherry for all purposes, in my opinion, being firm of texture, large in size, a good bearer, and of extra good flavour.

Elton (red).—A well-known old cherry; one that crops well, is very sweet, and of good constitution.

Reine Hortense (red).—A cherry of large size, very rich in flavour, and fleshy; it also crops well.

May Duke (red).—This is grown mainly because it forms so much pollen, whilst its fruits are ever welcome for fruit *compotes*.

THE FUTURE OF CACAO PLANTING.

By Mr. H. HAMEL SMITH, Editor of "Tropical Life."

[Lecture delivered June 11, 1908.]

I THINK it will be agreed that, until quite recently, those interested in the production and shipment of cacao paid absolutely no heed to the improvement of the quality and quantity of the output. Looming out like a prominent shade tree down the valley of time is the well-known name of Strickland, whose method of fermenting cacao has grown to be admired as the classical one. Whether Strickland's method is perfection I am not going to discuss, but there is no doubt that, with very few exceptions, the cacao planters, ever since they first cultivated Linnæus's "Food of the Gods," put in the bean, grew the tree, picked the pods, and sweated and dried the beans exactly as their fathers and grandfathers did before them, and their neighbours are doing to this day.

The light of new ideas broke like the sun across the mist from the East. Although Ceylon's planters, so far as I can gather, are staunch Conservatives in politics, they are unmitigated Radicals—nay, positive anarchists—in agricultural matters. Like Why-Why, Andrew Lang's first Radical, they let nothing pass them unquestioned, and no matter how high the authority the idea may come from, they go straight to the root of everything, and with chemicals, knife, and microscope examine and analyse the minutest atom of the most sacred theory, until they have proved its truth or falsity to their entire satisfaction, and if true, whether it can be put to practical advantage.

I am glad to say that this system of indefatigable research has spread to the West Indies. Thanks to the work done by the owners of those well-known names, Morris, Harrison, Fawcett, Watts, Hart, Hudson, Cradwick, and many other cacao-planting experts, planters in Central America and the West Indies have of late become more alive to the importance of looking into the why and the wherefore of their methods. Circumstances point to the general run of planters in the near future paying much more attention to the following matters than they have hitherto been doing.

1. Feeding and sustaining the strength of their trees by judicious manuring, so as to replace those constituents that have been removed by the crops.

2. The grafting of cacao, whereby a strong and free-yielding variety will have for scion a more delicate variety with an improved output.

3. Giving their immediate attention to, and finally exterminating insects and other pests as soon as they are observed.

4. The adoption of vacuum-dryers on those estates large enough to use them with economy, or the erection of them as an independent central drying factory, run perhaps on co-operative lines among the smaller planters.

5. The possible reduction of shade trees in certain centres, on account of their tendency to encourage pests and disease, and to retard the growth and output of the estate.

6. The increase of the area of mixed plantations—mixed, not inter-mixed—the hardier trees, such as rubber and others, to be planted as belts around or through the main crop. This will not only remove the risk of relying entirely on one crop, but restrict the area of pests and disease, and, when such appear, enable the planter to treat them at once before the mischief spreads further.

Other improvements no doubt will come in the train of these, especially as regards the sweating of cacao, of which we still have but an indifferent knowledge. Whilst on this point I should like to call attention to "Bulletin" No. 10 of the Surinam Agricultural Department, wherein Dr. Sack, as a result of his investigations into the causes and effects of sweating cacao, makes the following assertion: "The sweating of cacao is primarily a biological and not a chemical process." This was proved by the fact that samples treated, one with formaldehyde and the other with chloroform preparations, both destructive to life, but not influencing chemical activities, did not ferment, while the temperature remained at 28° C. The temperature of the other samples not so treated, but fermented in the usual way, rose from 28° C. (82° F.) to 40° C. (104° F.), but when treated with chloroform fermentation ceased. Another experiment showed that sugar in the pulp is essential to fermentation and the incident rise of temperature. This was proved by the fact that beans washed before being put to sweat did not ferment until syrup was added. The vitality of the seed is destroyed during fermentation. The seeds die at 44° C. (111° F.), whilst in sweating in the ordinary way the heat will go up to 112° or 113° F. It is also claimed that the change of colour is due to an enzyme. If steeped in boiling water no change takes place until unsteeped kernels are added. This, of course, is nothing new; Dr. Axel Preyer, in 1901, wrote on the matter in "Tropenpflanzer," and showed that the fermentation of cacao was brought about by living organisms just as is the fermentation of tobacco, &c. Preyer succeeded in breeding pure cultures of these organisms.

As regards manuring, this matter and the extermination of pests can be said to go hand in hand, for the cacao tree is such a faithful servant that it will wear itself out in fulfilling its duty, and it is not its fault if, as it gets weaker and worn out, it cannot throw off the enemies that attack it. It is for its owner to see that it receives its proper nourishment, and is not left to starve while he spends the money on himself that the trees so willingly bring to him. As we now stand we have in many of the older centres to cure the diseases, but to cure is by no means sufficient, the planter must take precautions that the disease does not return. This can only be avoided by building up the strength of the tree as you would that of a human being, and so help it to withstand the return of the old complaint. Recent experiments in the West Indies and elsewhere have proved the great benefits to be derived from mulching. Even when this treatment consisted only in burying leaves and green matter, the trees paid well for the labour involved. Moreover, the results have proved phenomenal when the material collected for the purpose of

mulching has been composted by adding lime or basic slag, which helped to liberate large quantities of plant-food which might otherwise have remained unavailable. The addition of basic slag or similar fertilizing matter has, further, the advantage that it makes good the deficiency of the compost in phosphoric acid, and thus assures that the other fertilizing ingredients in the compost are well balanced.

According to Bert de Lamarre (Trinidad), pen manure for cacao trees is exceedingly good, although it does not contain enough phosphate of lime to form the skeleton of the tree and not enough potash. It is principally due to the absence of or want of sufficient phosphoric acid, lime and potash, that so many young flowers and pods drop at a time, not having the necessary strength to resist the wind and weather. The condition of the tree in these circumstances is an abnormal one, having flowers in quantity, but wanting the necessary elementary material in circulation to produce what such trees are capable of, if well and normally fed. The presence of fungoid pests on cacao trees is partly due to the want of strength of the trees to resist the diseases caused by living parasites, animal and vegetable, and potash in good quantity should be supplied.

When land is not pen-manured or requires to be pen-manured again the best and cheapest plan is to plant strips of sweet potatoes, in cane-fields when the canes are planted, and in cacao-fields at any time, and to let them grow until immediately before throwing out tubercles, when they should be buried, root and stem, in the soil.

I mention sweet potatoes as they are well known here, but perhaps some people may not know the woolly pyrol, which is grown in Barbados and has the advantage of not being edible, as is the case with ordinary sweet potatoes, which sometimes, when the growth is quick, cannot be buried before the product is exposed to the usual pilfering.

Green manure, or green dressing by sweet potatoes, woolly pyrol, or American peas is one of the best available sources of nitrogen that can be offered to plants, and it is advisable to employ green dressing and to manure in this way wherever possible.

One of the most important fertilizing ingredients for the cacao tree, but at the same time the most costly, is nitrogen. Fortunately, however, we have the leguminous plants which absorb the atmospheric nitrogen, and which, used as green manuring, could easily supply the cacao tree with its nitrogenous requirements. Would it not pay to cultivate ground nuts (*Arachis hypogaea*) or some other leguminous crop that would grow under shade in order to have material rich in nitrogen at hand for mulching between the trees? Would it be possible to grow it sufficiently well under the cacao to produce the nodules underground? If cultivated as a crop for the oil the cake is still of great value, as it contains $7\frac{1}{2}$ per cent. of nitrogen, whilst the leaves have 1 per cent.

"Farmers' Bulletin" 315 (January, 1908) of the United States Department of Agriculture, commenting on the inoculation of soils or seeds with pure bacteria cultures, states that, in some cases where there has been apparent failure to improve the legume crop, further examination may show a decided gain from inoculation. Even where the lack

of nodule formation does not seem to hinder a healthy development of the plants, careful comparisons from analyses have shown the greater protein contents of those well supplied with nodules. The amount of nitrogen contained in a soy bean crop* was found in one case to be 118·55 lb. to the acre for the inoculated plants, and 75·98 lb. to the acre of those not inoculated, yet the appearance in the fields was the same. With cow-peas, inoculated and uninoculated, the nitrogen was found to be 189·21 lb. to the acre for the former and 118·45 lb. for the latter. In each case, therefore, the inoculated crop, although apparently not improved, was in reality more valuable for feeding or for green manure than the uninoculated crop.

In addition, it should be noted that with the inoculated plants the gain of nitrogen came largely from the air, while the plants lacking nodules drew upon the combined nitrogen of the soil. When the gain in nitrogen from inoculation is accompanied by largely increased plant growth, the beneficial effect of nodule formation is, of course, most pronounced. Some chemical analyses† of Canadian field peas, inoculated and uninoculated, serve to show, in a striking manner, the comparatively rich growth of the inoculated peas. The plants bearing nodules had a nitrogen content of 2·29 grammes per cent. of dry substance; the plants without nodules grown in the same soil had 1·60 grammes per cent. of dry substance. The average dry weight of inoculated and uninoculated plants was 11·2 and 2·3 grammes respectively. It is evident, therefore, that the inoculated plants supplied more than seven times the amount of nitrogen furnished by those not inoculated, viz. 0·255 gramme to the plant, as compared with 0·035 gramme to the plant respectively.

Generally speaking, the experience of scientific farmers and the tests of agricultural experiment stations agree in ascribing an unusual benefit to succeeding crops from green manuring with leguminous crops; and this is clearly due, in a considerable degree, to the nitrogen fixed by the root nodules, and not to the length of the root system or other peculiarities of leguminous plants. Unfortunately, investigators have not given sufficient attention to the relative abundance or scarcity of nodules when experimenting with different leguminous crops for green manures.

Many planters in the West Indies will tell you that the ideal manure for cacao is sheep manure, but unfortunately the supply is limited and costly; also leading authorities maintain that the manurial value is uncertain. Bird manure, guano, or poultry droppings are best, as a rule, for sustaining and building up the strength of the trees; but unfortunately these manures are still more scarce than the sheep manure. In nearly every plantation the quantities of home-made manures are insufficient to give the whole plantation an adequate manuring; hence the necessity of using artificials, which, judiciously applied, not only increase the bearing capacity of the cacao tree but also strengthen the vitality and vigour of growth, so that they can

* Grown at Agricultural College, Mich. For description, see *Bulletin* 224 of the Michigan Station.

† Analyses made by the Bureau of Chemistry, U.S. Department of Agriculture.

withstand better, and recover more rapidly from, pest attacks, and are less injured by drought. Of course it is necessary to see that an adequate supply of lime and potash is there—that goes without saying—but for permanent nourishment a complete natural organic manure must also be used. One that is capable of supplying nitrogen, phosphoric acid, and potash to the soil is required. The guano obtained from the rainless regions of South America seems able to supply such a manure, and if purchased from reliable firms gives most satisfactory results. Unfortunately, as a rule, planters will not spend the money necessary to nourish properly their trees.

If the necessary nitrogen cannot be provided by home-made manure, or green manuring, then 1 to 2 cwt. of sulphate of ammonia, or $1\frac{1}{2}$ to $2\frac{1}{2}$ cwt. of nitrate of soda, to the acre may be applied, according to the condition of the soil. Some planters object to digging the ground between the trees, as they urge that in doing so you are apt to damage the roots. Others, including the Grenada planters, do not agree with this. On the contrary, I understand they consider it does good, as it allows air to reach the roots.

Of not less importance than nitrogen are the mineral fertilizing ingredients, phosphoric acid and potash. Whereas nitrogen acts to a certain extent as a stimulant, promoting the leaf and wood growth, the phosphoric acid conduces to the fruitfulness of the tree and to the formation of blossom and fruit; while potash promotes strong growth as well as heavy yielding properties. Phosphoric acid is supplied to planters in various manures. The two best known are basic slag and superphosphate. The former is particularly adapted to strong soils, to soils deficient in lime, and to soils rich in organic matter. Six to eight cwt. basic slag, or $1\frac{1}{2}$ to $2\frac{1}{2}$ cwt. concentrated superphosphate, to the acre may be an adequate dressing. The potash may be applied either by means of muriate of potash or sulphate of potash. On the lightest soils $1\frac{1}{2}$ cwt. is to be recommended, whereas on soils of loamy or clayey character 1 cwt. to the acre will be sufficient. Besides the manures mentioned above, there are many other artificial ones suitable for the manuring of the cacao tree. As the manuring of these trees, like that of all other plants, depends upon the nature and condition of the soil, I ask you not to consider the quantities mentioned above as a recipe, but as a summary of practical experience or as suggestions or hints deserving consideration.

I am most anxious to hear what the up-to-date cacao planter has to say on the question of grafting cacao; whether, on the whole, it is agreed that the advantages claimed for it are correct, and whether the principle will advance beyond the experimental stage. The idea has always appealed to me. It was always a subject of much interest to Mr. James Epps, the son of the founder of the firm, who died some three years ago in Jamaica, with whom I have had many discussions on the possibilities of the idea.

This idea is no new one. Mr. Hart, of Trinidad, in his book on cacao, states that in 1899 he discovered that cacao can easily be grafted by approach, and therefore a planter can secure a crop of one particular variety should he so wish. Mr. Hart returned to the subject again the

other day, and I was fortunate enough to secure his remarks on the matter for publication in the issue of "Tropical Life" for May last. Mr. Hart, I think it was, in the Annual Report for 1902 stated that the experiments made by the in-arching process, when the plants were in the seedling stage, appeared to be satisfactory. The larger experiments in this direction successfully carried out at Dominica are deserving of attention.

In Jamaica, I hear, budding has met with considerable success, both as regards evenness of sample and increase of yield. Mr. T. J. Harris published some interesting information on the results of his budding experiments in 1902 and 1903.

Granted, for the sake of argument, that it is as wise and even as necessary to graft cacao as to bud or graft rose or orange trees, let us consider which varieties should be used as the stock and as the scion. In his last "Bulletin," that for April, Mr. Hart gives statistics of twelve trees that gave an average yield of 253 pods each within twelve months, whilst the average of the six best trees was as high as 324 pods, the best giving 367 pods and the second best 355. Such trees, he thinks, should undoubtedly be chosen for seed to raise the parent stock from for grafting purposes. Being in Trinidad, these will, of course, be *Forastero* trees. As a rule, Mr. Hart seems to favour the *Calabacillo* variety for the stock. Mr. Evans, the acting Director of Agriculture at the Gold Coast, also a believer in grafting, I believe, favours the *Forastero* as the stock. For the scion there seem several competitors. No doubt different centres will find different scions, if not different stocks, to suit them best. Mr. Evans writes that he does not favour the *Pentagona*, recommended by some, as he finds on the West Coast of Africa that it is a poor yielder. The true *Criollo* of Venezuela, on the other hand, the *Ocumare*, he found to grow as well as the *Forastero*, and if it bears as well on the West Coast as it does in Venezuela it will probably be very useful to African planters as a scion. With all these lighter varieties, lighter both as regards colour and weight, it must be borne in mind that, for the more delicate scions to leave any mark on the produce, it must tend to reduce both the actual number and also the weight of the beans. This is one of the drawbacks in cultivating pure *Criollo*: you may score in the actual price, but certainly as long as cacao powder is so much in vogue the net proceeds, area for area, will continue to be on the side of the hardy, weighty, and more freely yielding *Forastero* and *Calabacillo*. One day I hope that the cacao and chocolate consuming public will realize the advantages of properly preparing their beverage by boiling, and then fine flavoured beans will be worth producing, for their more delicate flavour will be brought out and appreciated in the preparation. Until that happy day there is no doubt that, with the exception of a limited demand for fancy confectionery, it will pay the planter best to turn out cacao in bulk, produced from the most abundant yielding tree, taking care only that he and his neighbours send to market as even a bulk sample as it is possible for a producing centre to turn out. It is worth trying, by grafting or budding, to equalize the trees on an estate in order to obtain this evenness.

Mr. Hart recommends the Nicaraguan kind (*pentagona* or *largarto*—after all only *Theobroma Cacao*), as the scion, grafted on to the *Calabacillo*. The Nicaraguan cacao, very large and light both in weight and colour, sold at 110s. to 120s. when Trinidad *Forastero* was worth only about 55s. to 60s. Last autumn, when the common cacaos were fetching 110s. to 120s., the difference between the two was not so marked. I have always had a hankering after *T. bicolor*, which also is found in the Cauca Valley, as the stock. Being short, it would reduce the height of the tree, it is very hardy, it will improve with cultivation, and with its cousin (according to Bernoulli) *T. ovatifolium*—a cacao much thought of in Soconusco—or *T. angustifolium*, *T. bicolor* in some districts might be found to do good work, especially if strength and vigour were the main objects to be sought for in the stock.

A word on pruning *en passant*. Although some districts have not paid proper attention to this important item, I think that we shall all agree it is a process the value of which cannot be denied if you want to obtain the best results from your estate. First, I should like to know what is considered to be the ideal pruning set? Is my namesake, Mr. Malins Smith, of Diamond Estate, Grenada, right when he urges:

A large pruning saw, a recognised tool in the saw-making world, but shall it have two edges with different-sized teeth?

A smaller saw, perhaps a bow saw for preference.

A pair of spring pruning scissors.

A hand pruner of the coffee pruner type, with a wide, heavy blade and a nice parrot-beak tip. A great deal depends on that beak—it licks round and snips off the little branches so easily.

The knife or the scissors ought to be far the most in use. On a properly managed estate, except for a diseased or broken branch, the saw should hardly ever be needed, a half-inch branch being about as thick as anything that should require cutting. The instrument that wants to be very carefully handled when pruning is the cutlass, for there is no doubt that, even with the sharpest cutlass, there is a decided tendency to injure the trees and cause the sap to flow unnecessarily. This is a source of danger, for the sap either spreads disease or gathers it from the spores from affected parts.

From pruning we soon come to reaping, and here again the matter of bruising the trees or the stalks unnecessarily comes in. There is no doubt that for speed the goulet or pruner, either of the Trinidad or Guayaquil shape, is the quickest, but surely a tree pruner, worked with a wire or string, can, with practice, be used almost if not quite as quickly. At the same time it will do much less damage to the trees. I am glad to say there is a tendency for this sort of pruning to come much more into use. The other day I was asked whether I knew of a picker or pruner that automatically painted the trees with an antiseptic after cutting off the branch or pod. I had to own that I did not, though I had read of one in print; perhaps someone present may know of one and be good enough to tell us about it.

Coming to shading, I believe that the old implicit belief in it has had a rude shock of late. In the hot dry districts shading to a considerable degree is certainly an advantage, if not an absolute necessity, but in

damp districts it may even be injurious. Grenada is against the use of shade trees, and so is, I believe, Dr. Nicholls, of Dominica. Van Hall, in Surinam, does not seem to favour it except in dry centres. Everybody outside Trinidad, and many inside the island, agree that the estates there are, on the whole, over-shaded. There is no doubt that over-shading encourages *Nectria*. Malins Smith, in the notes that he was kind enough to send to "Tropical Life," stated that: "It is a fact that cacao planted with other trees lives longer, and does not exhaust itself so early as cacao grown alone. This is the best proof that shading is not to the interest of the planter, as it reduces the yield by saving the strain on the trees."

In the "Proceedings of the Agricultural Society of Trinidad" (March 1908) the question of shade or no shade for cacao has been discussed at various times during the last fourteen years by the members of the Society, but there does not appear to be any record of a serious or systematic attempt to obtain practical proof of the advantage one way or the other. Looking at the very superior yield in Grenada, where shade is not applied, it would seem worth while to experiment on a few acres in Trinidad, as recommended by Mr. Barrett, under such conditions and with such cultivation as are found favourable without shade elsewhere, and decide once for all a matter of such paramount importance to the island. The cost of the experiment would be trifling when compared with its importance. In a letter recently received from Grenada, the writer says: "I spent a few days last week at Diamond Estate, of which Mr. Malins Smith is the manager. Some fields have already given to date (January 19) six and seven bags of 182 lb. to the acre. The crop year ends on June 30 next, and it is estimated to obtain from 160 acres 1000 bags, equal to between six and seven bags to the acre. The next-door neighbour has already got in 240 bags from a small property of 45 acres, and another, a larger proprietor, 1600 bags from 350 acres. What estate in Trinidad planted with shade trees can equal the above?"

If over-shading diminishes the crop, it is becoming recognized that wind-belts tend to increase it. I do not believe, and never have believed, in inter-planting rubber and cacao. Rubber, the stronger-growing tree of the two, is bound to kill out the cacao in the end. I am, however, a strong advocate for planting mixed crops, both to distribute the risk and minimize the effects of adverse markets, as well as to serve as wind-belts and restrict the area affected by pests. I am entirely in favour of mixed plantations—i.e. growing cacao, rubber, coco-nuts, cotton, &c.—on the same estate, but in belts, and not intermixed. The great object in planting more than one product at a time is to neutralize as far as possible the bad effects of a "slump" in the market. The other day when rubber was down at 2s. 9d. for fine, hard Pará, cacao was up to 120s.; now cacao has come down to the seventies, rubber is going up again. Sea Island cotton is lower, and coco-nut products are not so high as last year; so any estate solely given up to one crop must feel the slump of low years much more keenly than it can appreciate high prices in a year of famine, even if it be one of the fortunate ones and have a good crop. Then again, mixed crops planted

in belts minimize the risks of disease by helping to confine an outbreak within a limited area.

Unfortunately, whilst modern science has taught planters how to establish large areas under one particular product, science has also brought in its train the very serious drawback of the ravages committed by insects and fungoid pests over extensive plantations of the same tree. What I have always urged planters to do is to plant more than one crop, arranging the different plants in belts throughout the estate. In laying out an estate of cacao and rubber, I would suggest that the rubber be planted all round the estate and through the cacao at right angles, the belts of rubber themselves being broken up by coco-nuts (*Cocos nucifera*), coffee, &c., where the lines cross, so as to restrict the area of disease in the rubber belt, should the trees become attacked. In manurial or other experiments these comparatively small areas would prove very useful. In the plan (fig. 31), coco-nuts are suggested as a break, but possibly coffee might be utilized for local consumption, or another

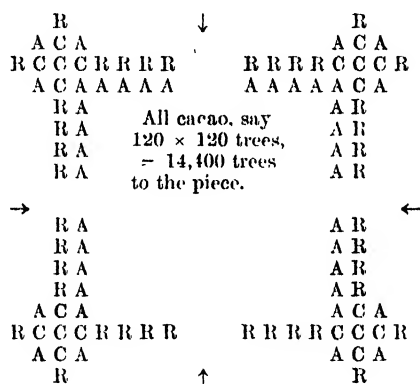


FIG. 31. — PLAN FOR PLANTING.

A = Cacao; R = Hevea or Castilloa rubber; C = Coco-nuts or other trees.
 Each row A = twelve rows of cacao; each row R = six rows of rubber.

kind of rubber, if found to be exempt from the diseases that Castilloa or Hevea, of which the main belts are composed, are heir to. Fruit trees would do admirably if their crop could be sold at a profit.

The idea of planting rubber between the cacao was for shade. Even if shade is necessary (and many centres claim that it is not, while experts urge that over-shading has aggravated the spread of canker in Trinidad), it is not right to mix rubber and cacao, for, if done, both crops suffer. In the end you are forced to cut out the cacao and leave the rubber, like a young cuckoo, to monopolize the nest, and before that the maturing and full crop-yielding stages of both products are retarded, and the yield reduced.

The plan, drawn up for friends in Colombia, shows the corners and junctions on a large estate: 14,400 cacao trees go to a piece planted 900 to the acre, whilst the rubber is planted only 200 to the acre. Should the quantity of rubber trees, in proportion to those of cacao, be considered too small, the latter could be dissected at right angles at the points indicated by arrows, or if that would give more rubber

than the owner cared to have, he need only cut through the cacao piece one way. Planted on the lines of the plan, with 14,400 cacao trees to a piece, at 300 trees to the acre, each block under cacao would be equal to 48 acres. To plant a quarter million cacao trees, therefore, would take seventeen or eighteen blocks, equal in all to about 835 acres, the area under rubber and other crops to be regulated according to the wishes of the owner.

I do not mind how profitable a crop may be at the time of planting, and what prospects there are of its continuing to be so in the future : it is always best for the planter to distribute his risks and not give himself up entirely to one crop. As regards the restriction of diseased areas, some such plan as I have suggested would have been invaluable in centres like Trinidad or Surinam. In Trinidad you often cannot tell, when walking through the estate, whether you are on that of your host or on that of his neighbour. With such methods of planting it is impossible to successfully fight any epidemic.

I cannot help feeling that the growers in Trinidad, after calling in Mr. Barrett as doctor, and satisfying themselves that the health of their trees is on the whole in a very bad way, tend to fall back again into the old lethargic way and let matters take their own course. I say this, for after having received many enquiries, often three or four in a mail, as to which spraying fluid or machine I can recommend, the matter seems to have stopped as soon as the enquirer sent a letter of thanks for the information. So far as I can judge, no orders have been sent. When I suggested to the makers of spraying machines that they should advertise in my Journal, and so do their own recommendation, they all replied that there was no demand for sprayers from that centre. I have had one exception, however, in my friend Mr. H. T. Moors, of Samoa, who writes that he has provided himself with three gallons of fluid and means to give the matter of spraying an exhaustive trial. That, however, is Samoa, not the West Indies. Whilst on this question I should like to add that many people, or at least many labourers on an estate, seem to think that when spraying the one object to aim at is to empty the receptacle as speedily as possible ; I would particularly caution planters against such waste, if the work is to be done thoroughly and economically. If the English producing centres are to enjoy their share of the world's cacao trade they must pay every attention to this most serious matter of pests. Old-established centres, like Trinidad, must eradicate them, and the newer ones, as the Gold Coast, must take care that they are not overrun with them. If they do appear they must receive immediate and drastic treatment. The loss from pests to Trinidad is enormous. Some time ago I pointed out in the "West Indian Committee Circular" that, whilst San Thomé had increased her output eleven times since 1888, the West India Islands, in spite of a large increase in the area under cultivation, barely keeps up to its average. I see that in his report Mr. Barrett calls attention to the same thing, and also calculates that this means a probable loss of a round million sterling a year to the island. It is only prosperous, happy-go-lucky Trinidad that could stand such a loss. It certainly does stand it and stand it very well : all the same it is a pity, for it causes the money to go into the pocket of another nation at the

expense of our own. In a word, I consider it is quite unpatriotic of Trinidad not to cause this amount to fall into its own pocket; the trade and prosperity of the Empire demand that it should do so, because then the inhabitants could order more goods from us, and send us more produce to sell.

Why do planters never put the trees in triangles instead of in squares when planting? Triangular planting enables you to get more trees into the acre, covers the ground more evenly with less crowding to the tree-tops, and has, so far as I have heard, nothing against it except—no one seems to plant that way.

It seems to me that the system of vacuum-drying will be adopted in the end on all large estates where the crop is sufficient to keep several chambers always busy. The cost is no heavier than that of the best known air-dryer, even when one chamber only is used, and when several chambers are used with only one pump and set of apparatus—for one pump can easily work several chambers—then the cost is comparatively low. There is less liability to scorch, and the very action of the vacuum that dries the bean by drawing out the moisture helps to plump them up and make them less shrivelled than when the moisture is expelled by other means.

In referring to the use of vacuum-drying installations for cacao, it would be interesting to consider the advantages that the makers of this apparatus claim for it. One can but admit that these claims have been entirely borne out in regard to most materials, such as fruit, rubber, chemicals, food-stuffs, &c. The experience of its use for cacao is however as yet so limited that it must be left to the common-sense of the individual to decide whether it is applicable in a like degree. The main advantage of vacuum-drying is that, by removing the pressure of the atmosphere, the boiling point of water is reduced to about half, or under half, the normal temperature. As the drying of cacao is a removal of the water contained, it follows that the work can be accomplished at an extremely rapid rate, and yet at a lower temperature than is often employed in the atmospheric or air-drying stove. The process is, of course, very economical, because the whole of the steam put into the apparatus is utilized, whereas with the air-dryer a very large proportion of heat is wasted in the excess of air which passes out of the stove still warm.

A further advantage lies in the fact that the conditions are always normal in a vacuum stove. The operator of the vacuum stove is, as it were, part of the machine, which creates its own "atmosphere," which is always the same. I refer to this as an atmosphere, whereas as a matter of fact there is no atmosphere, but I do this because it is the variable nature of the atmosphere that one encounters on the plantation which causes most of the trouble. I consequently find it a convenient expression in making comparison.

Being without air the vacuum stove is consequently without the impurities of the atmosphere. It is free from variable humidity. The disadvantage of the vacuum stove at present is its comparatively unknown action in regard to cacao. I can say, however, that one or more machines in use in the German Cameroons seem to have given every satisfaction; at any rate repeat orders have been received by the makers.

It may be interesting in this respect to know that these dryers have been supplied to a number of cacao factories for dealing with the manufactured articles in this country, and have, so far, proved conspicuously successful.

It has been urged against the vacuum stove that it requires a mechanic in attendance. This, however, the makers claim to have obviated by means of a vacuum pump of high-class construction but of simple design. Such a pump is said to be practically fool-proof, and capable of being understood and operated by a native labourer of the lowest degree of intelligence; it is claimed that these machines run for several years without any expert repairs. The pump is, of course, the only moving part of the installation, and is, therefore, the only part which need in any way be feared.

The vacuum drying installation consists of a series of steam-heated shelves, a condenser, a water receiver, and a vacuum pump. The beans are placed on nets or trays, which are put on the steam-heated shelves. The drawer is run into its place, made fast, the vacuum pump started and the steam admitted to the shelves. It is claimed that, if necessary, within an hour the pump can be stopped, the air admitted to the stove, which is then opened and the tray removed. The beans will then be found to be sufficiently dry. As a rule, however, a slower process is to be recommended. If 80 per cent. of the moisture to be expelled is drawn out by the chamber and the balance taken out by the sun, I believe that the result will be found to be both economical and perfectly satisfactory, both as regards cost and flavour.

For smaller estates and for very small plantations, I need hardly say that, in my opinion, there is no dryer to compare, both as regards cost and simplicity of construction, with the well-known Hamel Smith Dryer, a full description of which is given in "Tropical Life" for December 1907.

DISCUSSION.

The Chairman (Hon. WM. FAWCETT, late Director of Public Gardens and Plantations, Jamaica), in rising to invite discussion, said: With reference to the question of budding and grafting cacao, I may say that while I had charge of the Botanic Gardens in Jamaica I paid special attention to this operation. When Mr. T. J. Harris, under my direction and guidance, worked out a method for budding the mango, we found that the same method was applicable to cacao, and I came to the conclusion that budding was in every way more suitable and effective than in-arching or grafting by approach. However careful a planter may be in selecting seed for propagating purposes, the usual result is that the plants raised from the seed are of many different varieties—some trees having pods of very inferior quality and few beans; other trees, almost barren, producing only a few pods; others, again, with a large yield of pods, giving numerous beans of good quality. As soon as the trees have fruited and declared their quality, the planter may bud all the inferior kinds from good trees, and in this way get a plantation of trees with good yield of cacao, of uniform good quality. An established plantation may also be improved and made uniform by budding on old stocks. As

regards shade, I consider that it is not required in Jamaica for mature trees, and probably not anywhere, so long as the ground is shaded. But shelter belts are always necessary, and these should be planted at right angles to the direction of the prevailing winds at regular intervals.

At the Agricultural Conference held in Trinidad in January 1905, I ventured to call the attention of cacao planters there to the importance of trying experiments in starting estates with only the shade of the banana, as in Jamaica, and ascertaining whether, as I believed, cacao trees would not bear heavier crops, and be less liable to disease, if they were grown without permanent shade. Planting in quincunx fashion is not feasible if bananas are planted for shade during the first four or five years, nor later, if the cultivator is used.

Mr. W. CRADWICK (Agricultural Instructor, Jamaica), in the course of his remarks, stated: There are so many points raised in Mr. Hamel Smith's lecture that it is impossible in a discussion like this to touch on more than one or two. An afternoon might easily be spent in discussing manures, budding and grafting, the correlation of colour and weight, the question of the yield of the various varieties, the effect of fermentation on the different varieties, as well as the question of the net cash results of growing the different varieties, and the different methods of fermentation, drying, &c., pruning, shading, tools, distances of planting, plans of planting, inter-planting, the treatment of "diseases." The question of budding and grafting is a very fascinating one, the possible ideal of a plantation of strong-growing *Forastero* or *Calabacillo*, bearing the finest *Criollo* beans, uniform in colour, size, and weight, must be to every thinking man something worth struggling for. The method of obtaining this ideal will probably vary under different circumstances; but, except when no other method is possible, the slow and clumsy one of inarching will surely be discarded, if only on account of expense. Given good strong seedling stocks, of whatever variety has proved to be the most robust for the land which it is proposed to plant, good buds from pure *Criollo* stocks, the question of budding even large areas should not be a difficult one. I have given demonstrations in budding cacao among the small settlers in Jamaica, and I do not think I have ever had a bud fail, except from accidents; and where my small settler friends have taken it up they, too, although in many cases previously totally ignorant of the art of budding, have been uniformly successful.

The question of transforming old plantations of mixed varieties into a uniform variety is a good deal more difficult; the trees, if very old when cut down, often start to grow vigorously for a time, but the check occasioned by cutting down large trees seems to be in many cases too severe for them, and the glorious promise held out by the vigorous start is often not maintained. In cases, however, where the old trees have made gormandizers which have been budded, and the buds allowed to grow to a considerable size before the removal of the old tree, greater success has been obtained.

Jamaica would probably have a chance for the establishing of fields of budded cacao over any of the West Indian Islands. I take it for granted that we have all the varieties included in the collective name of *Forastero*, as well as what are laid down by Mr. Hart and other authorities

as *Amelonado* and *Calabacillo*; from these we can select stocks to suit any practical cacao soil and situation. We have a large area, bigger than that of some of the smaller cacao-growing islands, where anything but a pure *Criollo* tree can hardly be found. From these we can take seeds, raise seedlings, and provide buds in large quantities. Nowhere in the world can cacao be planted and brought into bearing so cheaply as in Jamaica; does not the banana far more than pay all expenses, and settle at the same time what appears to be a vexed question in other islands, of the proper kind of shade plant to use for the young cacao? It struck me as very odd when a paper on the future of cacao planting could be written and read without mentioning the banana. It did seem to me to illustrate how much more difficult and expensive it must be to establish a cacao plantation outside of Jamaica.

With regard to the question of manures, I must confess that, with the exception of the use of natural manures and perhaps lime and basic slag, we have not done very much in Jamaica, and what has been done has not proved encouraging. This probably has given rise to the impression that the planters in Jamaica are not progressive, but I am quite sure that if any maker of fertilizers can prove to the Jamaica cacao planter that by spending 10s. he can make 15s. or even 12s. 6d., he will find a liberal and staunch patron in him.

Judging from the lantern slides exhibited, the cultivation of the land in Jamaica is very different from that in Trinidad, or wherever the pictures were taken.

Forking and draining in Jamaica are, on all the good plantations, carried on continuously, except in a very few where drainage is unnecessary. In the paper we have just listened to, no mention is made of drainage. Many of the best Jamaica estates would be absolutely useless without their highly efficient schemes of drainage, which are by no means confined to level or low-lying lands, it having been found by actual experience that the contour of the land makes little difference so long as there is a clay subsoil.

The question of shading always appears to me to be one which can only be decided on the spot under consideration. I have never been able to understand how people in Grenada object to shade, while Trinidadians pin their entire faith on it. Of course, I am speaking from hearsay, as I know neither of the places mentioned.

That the question of permanent shading is a difficult one everybody should be prepared to admit. As I before intimated, the question of shading for the young plants has been settled for us in Jamaica by the banana, and this, too, has proved to be quite sufficient shade for old trees which are not exposed to hot, dry winds, and it, moreover, has the great advantage of being able to pay for the cultivation of the land on which grow both itself and the cacao. On good lands, fairly well sheltered even without the banana, the question of shade is an easy one, but where the land is not all it should be, where the trees will have to be exposed to hot, dry winds, then shading becomes a problem, though not perhaps in the first few years, when almost any tree which has been selected for shade proves fairly satisfactory. At this time the cacao trees are young, the soil good, and the demands made on it by the shade tree not heavy, the shade

itself is moderate and things go on right merrily; but after a time the crop commences to diminish, then it is usually the shade tree which is blamed, and the owner often begins to contemplate the removal of that shade tree entirely, and looks around for something else as a substitute, unmindful of the fact that all trees have old age as well as youth. The merits of various trees as fertilizing agents as well as shade trees have been discussed too well for me to attempt to add anything to it, but too much attention cannot be paid to the prevention of overcrowding by shade trees, as this is, in my opinion, a frequent cause of fungoid pests on both pods and branches, while the exclusion of light has a tendency to cause the trees to very largely diminish their output of flowers, and also encourage the growth of lichens, moss, &c., on the stems. Too much attention cannot be paid to wind-breaks, although the necessity for these will have been largely avoided if care and forethought have been used in selecting the proper aspect for the cacao plantation. Among the hills in Jamaica cacao planted on the western slopes luxuriates and bears splendid crops, while on the eastern slopes, often only a few yards away, it is next to impossible to get a tree to grow at all.

With regard to the question asked by the lecturer on pruning, I always divide this into two headings. First, the pruning of young trees or trees which have been properly pruned from the time of planting; and trees which have been neglected for several years and allowed to get into a mess, of which, unfortunately, in Jamaica we have too many. There is no question but that properly pruned trees are far more profitable than those which are allowed to grow wild, for while it is quite true that wild or unpruned trees may be found bearing enormous crops, it is also quite true that, taking the average bearing of a large number of properly cared-for trees, they will be found to give far better returns than can be obtained from unpruned trees.

The question of tools for the properly pruned trees is easily solved, as an efficient pruner would know at a glance what branches to remove before they are much bigger than an ordinary wheat straw. All such could, of course, be removed with an ordinary sharp pocket knife, no antiseptics, tar, grease, or paint being required. When it comes to disciplining the old unpruned trees, then the sharpest of saws, shears, and knives should be employed and I am also a strong advocate for a really good sharp cutlass, especially when this is in the hand of a black man, whose efficiency with this implement has to be seen to be understood. In many cases he can do very much better work with this than can be done with the best of saws, which latter, unless they are kept well sharpened and well greased, do much more harm in shaking the tree than is done by the sharp cutlass. When removing old branches the greatest care should be taken to pare the edge of the cut, the bark, and cambium perfectly smooth, all cuts, of course, being made in a slanting direction.

Mr. Geo. S. HUDSON, of Errard Estate, St. Lucia, in commenting on leguminous catch crops amongst cacao, said that in practical West Indian cacao-planting circles the pigeon-pea (*Cajanus indicus*) has hitherto proved the only successful leguminous plant, and that too only on the lighter soils and in the second, third, and fourth years of the cacao plant life. On heavy clay this plant develops few bacterial nodules, and on all

sides constant care is required to prevent the pigeon-pea branches overcrowding the young cacao, and "whipping" its delicate branch tips in gusts of wind. Cow-peas, of all varieties, velvet beans, woolly pyrol, and ground-nuts have all been unsuccessfully experimented with during the past few years. Either these crops require careful replanting every four months (the expense and labour involved being prohibitive), or their growth is so vigorous (as in the case of velvet and Bengal beans) that they are likely to do more harm than good to young cacao plants. Mr. Hamel Smith suggests the planting of ground-nuts in adjacent ground with a view to transporting the vines to beneath the cacao tree and burying them there. This system could only be economically defensible where the cultivation of ground nuts showed a clear net profit, and this would only be found on light sandy soils; the cost of harvesting the crop on a soil at all clayey more than eats up all the profits, in fact in the United States it is considered that to turn a drove of pigs into the ground-nut field is the cheapest way to harvest the crop.

Some three years ago, in his "Annual Report on Agriculture in Dominica," Dr. Watts published an analysis on the manurial value of weeds found growing amongst cacao and lime plantations. Speaking from memory an acre of these was found to contain manurial value equivalent to

1 cwt. sulphate of ammonia	.	.	.	value £0 16 0
2 „ basic slag	.	.	.	„ 0 8 0
$\frac{1}{2}$ „ sulphate potash	.	.	.	„ 0 8 0
				1 12 0

The system followed by all up-to-date planters now is to endeavour to bury these weeds green at least three times a year, and I think you will agree with me that in conjunction with applications of other manures this system is an excellent one, and of course the more bush grass, vines, or dead leaves that can be brought in from adjacent lands and buried, the better the results.

As the result of watching some ten or twenty manurial experimental plots for the last seven years, I think that the following facts have been brought out. The best estate results are obtained from heavy applications of pen manure, combined with basic slag, annual forking and burying of weeds, with careful pruning and cultivation. Not one planter in a thousand however, can apply pen manure to all his cacao, therefore I regard basic slag combined with annual forking, burying of weeds, careful pruning and cultivation, as the stand-by of the cacao planter, and the results which have been published by the Imperial Department of Agriculture, and the experience of private planters in Grenada and St. Lucia, fully bear out this statement. Those who have these matters at their finger-ends may object that the best results have been obtained from mulching in Dominica, and correctly so, but the cognate point is—can the average private planter obtain a sufficient quantity of lawn mowings and Saman leaves to duplicate the conditions existent at the Botanic Station, Dominica? I think not, nevertheless the experiment has proved that mulching is a valuable adjunct to pen and imported manures. Our experiments have gone to prove that nitrate of soda and sulphate of ammonia, although useful to growing trees, do not materially increase crops; that potash is not an appreciable factor

in applied manures, and that phosphoric acid and lime in the form of either basic slag or bone, but *not* in the form of superphosphate, gives good results on all soils, and good results have also been obtained from the use of air-slaked lime alone.

I can fully confirm the remarks of our lecturer to-day on the subject of the indifference of planters to improved methods of cultivation, manuring, and curing. As agricultural instructor, under Sir Daniel Morris, for seven years, I found that disease was our best friend in shaking this indifference. A planter seldom woke up to high cultivation until he was thoroughly frightened by loss of income from diseased trees. As a consequence, even the severest disease attacks on cacao in St. Lucia have all proved a blessing in disguise, and the diseased estates either are, or will be soon, much more productive than they otherwise would have been. Therefore I am not at all anxious at the present reports of disease from Trinidad; it is, as Mr. Barrett graphically puts it, "up to you gentlemen" to let the trees die or restore them to health and larger crops, and the greater the scare the more beneficial the results.

I am glad to see the question of grafted cacao has been brought under discussion by our lecturer to-day. It is a matter which interests me specially. It lies for the practical planter in a nutshell, the kernel of which is: I can plant a selected seedling, six months old, from a bamboo pot at a cost of about 1*d.*; on the other hand, it will cost me anything from 1*s.* to 2*s.* per plant grafted. In one case the cost of plants for an acre of cacao at 16 feet apart is 20*s.*, and, on the other hand, the cost of grafted plants per acre may run from £10 to £20. Now, the reason why there is not such a thing as an acre of grafted cacao in the West Indies, or perhaps in the world, is that the practical planter has hitherto been unable to lay his hands on any variety of cacao that is so pre-eminently lucrative over other varieties as to make it worth his while to say, "I cannot afford to grow any other variety than this particular one," as a market gardener might say of pears or apples, or a sugar planter of seedling canes. We were always able to find a superior bean with inferior vigour in *Criollo* or *Pentagona*, and we were always able to find an inferior bean with superior vigour in *Amelonado*, and we could find these two qualities meeting at a point of mediocrity in certain sub-varieties of *Forastero*, but from the £ *s. d.* point of view there was not much in these differences of quality and quantity, and 95 per cent. of West Indian planters said, "I prefer a vigorous and productive tree with a low quality bean," and I think they were right.

Some ten years ago I perceived that the production of a single cacao tree combining high quality, high yield, and high vigour would revolutionize cacao planting throughout the world, and I set myself to produce that tree, not by high manuring, or methods inapplicable to ordinary estates, but by approved principles of cross-fertilization. My experiments so far have succeeded in the production of twenty-five cacao trees, now bearing their first pods at three years old. These are unique in vigour and quality, and promise to increase the average yield of cacao from 50 per cent. to 100 per cent., and consequently the profits of the cacao planter by that much; the average net return of dried cacao from each pod is double that of ordinary varieties of cacao, being 2½ oz. per pod. The

self-fertilized beans are equivalent to *Criollo* in quality, and the pod capacity of the trees is equivalent to that of the most productive varieties. These twenty-five trees are situated in St. Lucia, and, exposed as they are to the influence of cross-fertilization from inferior varieties, seedlings from them would soon degenerate to a *Forastero* type; they can, therefore, only be safely propagated by grafting, which work I hope to start on my return to St. Lucia in the autumn.

Another point about grafting I should like to call your attention to is the difference in early bearing of grafted trees as compared with seedlings. At the Botanic Station, Dominica, there is now a specimen of a grafted cacao tree, eighteen months old, bearing sixty large pods. This trait of early bearing in grafts is in itself calculated to revolutionize cacao planting in favour of grafting.

Mr. J. PETERS, in speaking on the manuring of the cacao, said: In his interesting lecture Mr. Hamel Smith referred to manuring as one of the most important means of making the cultivation of cacao pay better, a view which all experts will endorse without hesitation. Soils in which the fertilizing ingredients in an available form are present in such proportions as to suffice for any length of time for the normal development of the cacao tree are, indeed, very rare, and the majority of cacao estates are badly in need of manuring. It must always be borne in mind that, however fertile the soil may be originally, continuous cropping is bound to exhaust it, unless measures are taken to restore the fertility.

The methods of supplying the cacao tree with the necessary plant-food vary considerably. On many estates the leaves, which are shed from the cacao trees, together with those from the shade and wind-belt trees, form the only manure for the cacao tree, and many planters imagine that by forking in these leaves they are fully satisfying their debt of obligation to the soil for the substance which the soil has yielded up to the crops grown thereon, whereas a simple calculation would show them that this method of manuring does not restore those quantities of plant-food which are removed from the soil by the cacao. Other planters maintain that the growth of leguminous crops adds fertility to the soil. While this is true with respect to nitrogen, the leguminous plants add nothing to the soil's supply of phosphoric acid and potash. The planter should also recognize that as farmyard manure, compost, and other kinds of home-made manure, which form an excellent basis of manuring for the cacao tree, are only at the disposal of the planter in limited quantities, recourse must be had to artificial fertilizers, if the fertility of the soil is to be maintained, and the sooner the planter becomes cognisant of this fact the less trouble will he have in restoring a run-out soil.

Artificial manures, unless specially compounded, are not complete manures, but contain only one or two fertilizing ingredients. Thus, by the rational use of same, the planter has the advantage of supplying just those fertilizing ingredients that are wanting, and which cannot be applied by natural manures in the right proportions. On the other hand, artificial manures, unlike natural manures, do not enrich the soil in humus, which is so often deficient in cacao soils. This seems to indicate that the combined use of natural and artificial manures would be the most advisable method of supplying the cacao tree with the necessary

plant-food, and of improving the mechanical condition of the soil; but when this is not possible, owing to the limited supply of natural manures, the planter should not refrain from manuring with artificial manures, as these are able to replace the natural manures as far as plant-food is concerned.

In selecting suitable artificial manures the planter has to bear in mind that the cacao tree produces leaves, flowers, and fruit throughout every month of the year, and that it therefore requires a supply of fertilizing ingredients which will not be absorbed within a few weeks of application, but which will form a lasting source of plant-food during the whole year. It is therefore advisable not to use highly soluble manures at all, or to use them only in smaller quantities at certain intervals. If, for instance, the whole amount of fertilizing ingredients is supplied by means of highly soluble manures in one application, there is, besides a loss of plant-food by drainage and possible conversion of the same into unavailable forms, a certain danger that the cacao tree will absorb the fertilizing ingredients too freely, and become thereby overfed and weakened. As, however, most cacao planters do not resort to divided applications, the following suggestions for manuring advise as, far as possible, only such artificial manures as may be applied in one application without fear that loss of plant-food will occur, or that abnormal absorption of plant-food will take place.

On estates which regularly apply farmyard manure or compost to the plantations it will probably only be necessary to supplement the annual dressing by one or two hundredweight of basic slag to the acre, in order to make good the deficiency of phosphoric acid in the natural manures. If, however, farmyard manure or compost cannot be given annually, then a complete manuring consisting of about 4 cwt. basic slag, 1 cwt. sulphate of potash, and 1 cwt. sulphate of ammonia, may be used in the intervening years; but if it is possible to procure the amount of nitrogen supplied by the 1 cwt. sulphate of ammonia by means of green manuring instead, this source is preferable. Planters who do not use farmyard manure or compost, but who annually fork in the leaves shed by the cacao, shade, and wind-belt trees, will likewise be well advised to apply a complete manuring consisting of about 5 to 6 cwt. basic slag, 1 to 1½ cwt. sulphate of potash, and 1 cwt. sulphate of ammonia to the acre per annum. If, however, the additional trees belong to the leguminous family, the amount of nitrogen recommended may be reduced to ½ cwt. sulphate of ammonia, whereas the quantities of basic slag and sulphate of potash may be increased by half the amount suggested, in order to stimulate the leguminous trees to absorb the atmospheric nitrogen more freely.

The above quantities of manures would be suitable for about six-year-old plantations, but they should be decreased for younger plantations and increased for older plantations.

As regards time of application, the farmyard manure, basic slag and potash should be applied before the heavy rains set in, and forked into the ground without delay; the sulphate of ammonia is best applied at the end of the rainy season. If, however, the sulphate of ammonia is applied at the same time as the basic slag, it must be borne in mind that these two manures should not be mixed together before application, as

the lime in the slag liberates the ammonia in the sulphate of ammonia; but if the basic slag is applied first, and the sulphate of ammonia shortly afterwards, no loss of nitrogen need be feared.

Judging from the results obtained in the various cacao-growing districts, there can be no doubt that by judicious manuring not only are the yields of the cacao tree profitably increased, but a quick and strong development of the cacao tree is ensured, in consequence of which the trees give a fair crop at an earlier age, are better able to overcome injurious influences, and maintain their bearing capacity for a longer period than when not properly manured, thus greatly diminishing the risks which are said to be attached to the cultivation of cacao.

Mr. B. BERNARD ACHAM, Saint Isidore Estate, Trinidad, in commenting on the paper, said: I am in accord with the lecturer on the question of manuring, and I have little doubt that Trinidad could considerably increase her cacao yield if our planters would only adopt an effective system of manuring and thin out the excessive shade on their estates. I may mention that I intend visiting Grenada to study her system of shade and manuring, and it is possible that I may go to Dominica as well. There is no denying the fact that Grenada beats us in yield on a soil which, generally speaking, is not equal to ours in fertility, but in discussing the extent of her yield one must not forget that more trees are planted to the acre than in Trinidad.

As regards the question of grafting, it is not at all easy to say that it can be profitably adopted and practised on an estate which is not conducted for experimental purposes only. I fear that for some time the grafting of cacao will remain at the experimental stage. In any case, so long as we plant the *Forastero* in Trinidad the question of grafting will never present itself as an insistent need with us. I am a good deal interested in the idea of vacuum-drying for cacao. Generally speaking, I do not know that artificial drying will be much practised in Trinidad; there is a prejudice against it, and the tendency of our rainfall to decrease also tends to lessen the necessity of resorting to artificial means for drying.

Concerning the vexed question of cacao shade, as I have stated elsewhere, I do not know that Mr. Barrett is not right if the matter is considered in the light of principle. I think Mr. Barrett is correct when he asserts that the cacao tree *per se* does not require shade. Unless botanical learning is a snare and a delusion, a green-leaved plant, generally speaking, needs sunshine to do its work of growth and fruitage; and so long as the cacao tree decides to remain a green-leaved tree, sunshine it must have. It is true that no estate in Trinidad has ever been planted without shade; and the shade-zealots, confounding Trinidad with the rest of the world, are apt to cry out that a cacao tree cannot grow without shade. But there is Grenada, where cacao is grown without shade. I know the stock reply that Trinidad is not Grenada; and, whilst I believe, as everyone must believe, in the fact and potency of environment, I refuse to see any abnormal or specific difference between the conditions of Trinidad and the conditions of Grenada in relation to cacao culture. In listening to the people who raise the cry of *distinguo*, one sometimes fancies that Grenada must be somewhere in

the temperate zone, leaving Trinidad down there in the fire of the heat-belt. No one who is not eccentric in his ideas of physical geography can deny that the conditions obtaining in Grenada and those in Trinidad are, for practical purposes, alike in so far as is concerned the cultivation of cacao; and, therefore, if cacao can be grown without shade in Grenada, it can be similarly grown in Trinidad, provided the Grenada style of cultivation is followed. Does this argument carry with it the apparent corollary that we, in Trinidad, must chop down our immortelles? For a variety of solid and substantial reasons I advocate no such vandalism. To quote the words of Mr. Barrett:

"What then? Cut all the immortelles . . . at once? *Decidedly not.* Cut out dying ones and thin out gradually where your judgment tells you the cacao is not getting enough light to make a healthy growth. *But until you have effective wind-belts around and through your cacao, and until you have the cover crop—the live mulch—matter well under control,* do not make a bad matter worse by exposing the tender young cacao branches to the whipping and drying action of the winds, nor let their roots be broken and baked by the cracking and drying of the soil during the dry season."

There, in this passage, is stated the essential object of cacao-shade; to conserve soil-moisture and to act as a wind-protector. It will be seen that if this theory of shade is correct it will revolutionize our present system of cacao cultivation. I am beginning to suspect that our present system of shading is responsible for the excessive shedding of cacao leaves: we shade far too much, with the result that our cacao trees acquire a sort of weather-sensitiveness which perhaps would not afflict them if exposed to more sunlight.

I am glad that the lecturer, whilst in favour of mixed plantations, has drawn a distinction between *mixed* and *intermixed* plantations of cacao and rubber. I suggest that this point is of vital importance. Undoubtedly there is a considerable body of responsible opinion in favour of *intermixing* cacao and rubber; but, with much deference, I venture to doubt that this is quite a wise system. We must remember that a plant is a living organism, and as such is a creature of its environment. Now, a cacao tree is a more delicate tree than a rubber tree; so that when you plant these two trees together, the resulting contest between them must, other things being equal, be in favour of the rubber. I believe in so planting your cacao and rubber that the struggle for life between them shall be freed as much as possible from conditions of severe stress. I regret that exigencies of time forbid me from saying much more on this important subject.

Mr. ROGELIO CHACÓN, Consul for Costa Rica at Liverpool, said: I notice that Mr. Smith does not believe in interplanting rubber and cacao, but is an advocate for planting more than one crop at a time in order to distribute the risks and minimize the effects of adverse markets. Preference should be given to any tree or crop that contributes nitrogen to the soil. Some of our banana planters in Costa Rica are beginning to plant cacao with their bananas, as it is felt that (the latter being so exhaustive to the soil and unable to be continuously planted on the same spot) it is advisable to have the cacao to follow on. Up to now, unfor-

tunately, no use having been discovered for the banana stem, the fibre even not being worth extracting owing to the cost of transport and the high price of labour in Costa Rica, it is a vexed question what to do with the banana stems on a cacao estate. Will it be advisable to leave them rotting on the ground? Would that not be inclined to spread disease and pests?

Under such circumstances I should like the lecturer to answer the following queries:

1. Do you recommend the interplanting of cacao and bananas?
2. If so, at what distance apart should they be planted to avoid overcrowding and over-exhaustion to the soil?
3. Up to what age can the bananas be left with the cacao without exhausting it too much?
4. Up to what age can the bananas be relied upon to effectually shade the cacao?
5. Can the bananas be relied upon to act as a wind-break?
6. Do they supply any nitrogenous food to the soil?
7. As a wind-break, in case of hurricanes with a chance of damage to the bananas, would not leaving a space of, say, 18 feet prevent any serious damage to the cacao trees?

Mr. A. N. DIXON (Jamaica) stated that he intends to keep to *Forastero* cacao, and so did not feel able to give any practical suggestions on grafting or budding. With regard to shade trees, he found from experience that, on certain ridges, failure attended every effort to establish the young cacao trees until after the "Guango" (Saman tree)* had grown up and shaded the ground.

Mr. A. E. EVANS, of the Agricultural Department, Aburi, Gold Coast, said: I am strongly in favour of belts of various economic trees to divide up estates, especially where there are large areas of only one product under cultivation. In the first place, belts greatly tend to minimize the spread of fungus and insect pests, and secondly, they act as wind-belts (a very necessary item in cacao cultivation). At the same time, the trees for forming these belts should be selected with care; those which can be planted close together should have the preference. The belts should be at least 100 feet wide, and for the Gold Coast I have always advised planting the native rubber tree (*Funtumia elastica*) as it is practically free from disease, and can be planted very close together. It gives a good revenue within seven years from the time of planting.

I do not agree with the lecturer in the matter of interplanting cacao and rubber, and I always advise the planting of these two products together. Cacao considerably helps to decrease the expenditure of the upkeep of a rubber estate, and the two crops can easily be grown together for at least twelve years. You would thus get seven years' revenue out

* The Saman tree (*Pithecolobium Saman*), known in Jamaica as the "Guango," is also recommended by Hart as a shade tree on estates. O. F. Cook, in his *Shade on Coffee Culture* (Bulletin No. 25, U.S. Department of Agriculture, 1901), devotes over a page, a much larger space than he gives to any of the three hundred and more shade trees mentioned by him, in commenting on pros and cons of the Saman as a shade tree. Planters in Jamaica, however, were much surprised and disappointed at the easy manner in which the Saman tree broke down during the hurricane of 1908; the *Erythrina* withstood the wind much better.

of the cacao even if you had to cut it out after the twelfth year. This is well worthy of consideration, as the cost of planting and upkeep thus becomes very trifling.

Turning to shade, I think that a little light shade is beneficial to the cacao plants in dry and exposed situations, but it should never be allowed to become so thick as to exclude sunlight. It is a very simple matter, when pruning the cacao trees, to thin out some of the branches of the shade trees, and if this is done I think that you would find that the yield of cacao would considerably increase. Take the yield of cacao at the experimental station, Aburi, for example. The last returns gave $4\frac{1}{2}$ lb. per tree. These trees are about fifteen years old, and are growing on a hill-top 1500 feet above sea level, in exceedingly poor, gravelly soil, with a rainfall of 47 inches per annum. These trees are lightly shaded with the Saman, or rain tree (*Pithecolobium Saman*), planted 50 feet apart, and the branches of which are annually thinned out.

During the rainy season the land between the rows of cacao trees is lightly forked and cow-peas (*Vigna*) planted. These, together with the cuttings from the shade trees, and the leaves which fall from the cacao, serve as a mulch during the Harmattan or dry season. I might mention in passing that these trees look very healthy, whilst trees in the near vicinity which received no cultivation are miserable, weedy specimens, and I doubt if they yield 1 lb. of cacao per tree, showing the advantage of mulching, judicious shading, and a little cultivation. I would certainly not advise cultivating ground-nuts as a leguminous crop under cacao, unless the soil happens to be of a light, sandy nature. Pigeon-peas (*Cajanus indicus*) or American cow-peas will be found far more valuable from a manurial point of view.

In summing up, I consider that the quantity of shade entirely depends upon the situation. In the moist districts shade is unnecessary and tends to increase fungus and insect pests, but in exposed, dry situations a light shade is beneficial. Unless the trees are in a healthy state, they cannot expect to survive the attacks of fungi and insect pests, and they can only be kept in a healthy state by good drainage and cultivation. Although the output of cacao from the Gold Coast has made such rapid strides during the last ten years, it will come as a surprise to you to know that probably not more than 25 per cent. of the plants grown on the Gold Coast reach maturity; this is due to raising plants from immature and diseased beans, faulty drainage, and lack of cultivation. The few native estates that are properly cultivated give excellent returns and well repay the owners for the extra care and money spent on their cultivation. I might mention that all trees on the Gold Coast are planted triangularly. Were the whole of the area under cacao on the Gold Coast tended on these lines, our output would have been nearly 80,000,000 lb. instead of only 20,000,000 lb. last year.

The pruning set adopted by Mr. Malins Smith is very good, and should be on every estate. It is a great pity that the manufacturers of pruning implements and spraying machines do not advertise more in the tropical papers. If they did they would not only increase their output but would help the planters to get the right implements. The cutlasses as used on the Gold Coast are most unsatisfactory implements for

pruning and trimming—planters should use a better-class article altogether. I feel certain that there are thousands of native planters on the Gold Coast who would purchase better-class cutlasses and pruning implements if they only knew where to obtain those of a reliable make.

Too much attention cannot be paid to the matter of diseases and insect pests, as when once they become established it is a very expensive item to exterminate them. The planter should always be on the alert, and at the first sign of an outbreak all hands should be put on to prevent its spread, and when that has been done the cause should be enquired into and means taken to remedy it so as to safeguard the trees from further outbreaks. The knife should be freely used, and, in the case of canker or fungi, the cuttings immediately burned, and the wounds tarred over. A good many more pods would remain sound if they were occasionally sprayed with Bordeaux mixture or other fluid whilst in the young state, but unless the planter takes care to see that his trees are properly nourished and looked after he cannot expect to keep them free from disease. A cacao estate should be treated as the entries in a ledger account: the more you wish to draw out the larger the amount you must pay in, otherwise you will soon come to grief.

Mr. SMITH, in reply, said: I was very glad to hear Mr. Cradwick say that in Jamaica, at least, planters are willing to manure once they see that it is to their advantage to do so. This is what I call a fair challenge, and I have no doubt that the fertilizer manufacturers will take the matter up. Here at any rate is a much-needed chance for them to show the cacao-producing world generally that it pays, and pays well, to manure.*

The remarks made on the use of cutlasses bear out what I have already heard—that if planters would only use a decent implement the prejudice against them would be much less pronounced. In speaking favourably of their use Mr. Cradwick of course refers to a very different thing from the inferior article that Mr. Evans condemns, and which we all know so well by reputation. Manufacturers should pay more attention to these markets, and with regard to the West Coast they must not be discouraged because the natives have not yet learnt to appreciate a decent cutlass.† These can now be obtained at so low a prime cost in comparison with the inferior brands, whilst freight and charges cost the same on both qualities, that some improvement in the demand for the better quality cannot long be deferred. I shall call manufacturers' attention to Mr. Evans' remarks as to the difficulty of finding out the reliable firms from whom to buy pruning and spraying implements.

In disagreeing with my objection to mixing or interplanting cacao and rubber, Mr. Evans' remarks prove the reasons of my objection to this method to be correct. Why does he favour the idea of interplanting? Simply to reduce the cost of laying out a rubber estate during the first twelve years, after which if you find that the one crop causes the other to suffer, you could cut out the cacao trees, and so leave yourself with a rubber estate. If you wish for a rubber estate this is, I am sure, excellent

* Since the meeting, one of the Jamaica planters present at the lecture has sent out 10 tons of basic slag and some special cacao fertilizer to experiment with.

† One of the leading cutlass makers has now sent out a special set of samples to the West Coast, to enable the planters there to test the advantage of the better-class blades.

advice, but to-day I am only discussing the establishment of a cacao estate, not for twelve years, but as a permanency, and so I am right in saying that to interplant the two crops means the sacrifice of the cacao in the end. Meanwhile both suffer, otherwise you would not need to destroy one of them.

In answer to Mr. Chacón, I am certainly in favour of planting bananas between the cacao in those centres where a ready market can be found for the fruit. In Jamaica, and in Costa Rica as well, I feel certain from what Mr. Cradwick has told me from time to time that a careful planter can practically lay down his cacao at little or no call on his capital, owing to the profits accruing from the bananas. Of course, where there is only a local market for bananas, the case may be different, as nearly everyone grows bananas for his own use, but once you have a regular trade, as is the case with Jamaica and Costa Rica, the cacao planter should make as much of the banana, both as a subsidiary crop as well as shade, as possible. (Mr. Cradwick.—Hear, hear.) In such a case the cacao should be planted at least 12 feet apart, and better still 12 feet by 15 feet, and the row of bananas down the centre quincuncially. The bananas, or their offsets, could then remain as crop-givers for about five years, and occasionally, if the bananas grow tall and the cacao is kept low, even for six years, but no more. The actual time that they should be kept depends a good deal on local circumstances, and the planter must decide for himself as to whether the time has arrived to cut out the bananas. All this time the bananas should prove sufficient shade; in places the big leaves may even tend to over-shade the cacao, in which case some of the foliage would have to be removed. In saying this I take it, of course, that the bananas are planted and allowed a start before the cacao is put in. In Trinidad, even when bananas have been used as shade, I have known planters to place also three manioc sticks (*Manihot utilissima*), just the sticks themselves, in a sloping position towards the centre over the spot where the seeds have been buried. By the time the cotyledons appear these manioc twigs have been able to take root and throw out one or two leaves, which help to increase the shade immediately over the delicate plants. As a wind-break I cannot recommend the banana, as in anything of a gale it is the first thing to fall. At times when you wish to protect cacao from the coolness or coldness of the wind, rather than from its strength (and in Trinidad the wind at times certainly does seem to catch and nip up the trees), then, of course, bananas might be used; but if found liable to fall about and damage the cacao, they should either be planted at a distance (in which case their use as a wind-break would cease) or be cut out altogether.* I cannot imagine that the banana can give any nitrogen worth speaking of to the soil; perhaps Mr. Cradwick can answer that question better.

Mr. CRADWICK: The banana certainly gives no nitrogen to the soil, yet if properly utilized for conserving the soil moisture it is much more beneficial than plants which add a little nitrogen but do not protect the young plants from the effects of droughts. I would add as regarding the use of manihot for shading, that calabash (*Crescentia cujute*) sticks

* Since writing the above I hear that some 300,000 bananas have been thrown down in Costa Rica during a wind-storm.

might be used instead, and are, in fact, largely used, but there would be sufficient shade without bananas. I agree that bananas are of no use as a wind-break, although the damage that we are told they do to cacao by falling on the trees I think at times is over-estimated. The great thing to protect cacao from is the dryness, or rather the drying effect, of the wind, and to this end nothing better than bananas can be planted.

MUSHROOMS PROPAGATED FROM SPORES.

By Dr. M. C. COOKE, M.A., V.M.H.

It was in the year 1865 that the late Rev. M. J. Berkeley received specimens of a new species of edible mushroom from Bodelwyddan, on the banks of the river Elwy in Wales, which was duly described in the "Annals of Natural History" (under No. 1009) as *Agaricus (Psalliota) elvensis*, B. and Br. It was not recorded again, and nothing more was heard of it for sixteen years. About the year 1881 my late friend H. T. Wharton invited me to accompany him to the

FIG. 32. --*AGARICUS ELVENSIS*.

neighbourhood of Neasden reservoir, to examine some strange *Agarics* which he had seen growing in the drip of some oak trees. We made the excursion and found the fungi, which proved to be *Agaricus elvensis*, and each of us carried home an ample supply to experiment upon its esculent qualities, which were found to be excellent. It was a custom at that time, with both of us, to throw all maggoty fungi and all similar debris into our garden, in the hope that, at some time or other, some of them might vegetate. The same locality was visited several times afterwards, with the same results.

A year or two afterwards I was surprised to find some fine *Agarics* making their appearance under the drip of a pear tree, in my garden at Upper Holloway, which proved to be the identical *Agaricus elvensis*;

and they continued to appear periodically on the same spot until I vacated the premises in 1898, during which time we were sufficiently supplied with mushrooms of a fine quality, grown on the premises.

Subsequently I heard it reported that the same species had been found somewhere in France, and also a statement that it had occurred near Maldon in Yorkshire. These are the only instances of its appearance I have heard of.

About the year 1886 coloured figures of this species were published in "Illustrations of British Fungi" (plate 522) from specimens collected at Neasden in September 1881, and these are the only coloured figures which I have seen, and they had been submitted to and approved by the Rev. M. J. Berkeley himself.

After a long interval, Mr. Wharton, the son of my late friend, called on me early in September 1908, bringing with him a box containing about a dozen young specimens of *Agaricus elvensis*. When I expressed my surprise and inquired where he found them, he smiled and said: "Of course in our garden at Kilburn. We have always thrown all fragments of *Agarics* into our garden, and these have flourished for years under the drip of a pear tree."

This then is the important cultural fact which I wish to accentuate, that, in spite of innumerable failures to cultivate mushrooms from spores, this species has in two well-authenticated instances been propagated from fragments thrown away upon the naked soil, and has continued to flourish for many years. It may well be suggested that this large and finely flavoured species, in the hands of an enterprising cultivator (could the stock be obtained), would make a grand new diversion in the culture of mushrooms.

The original description of this species was thus stated:

"Crespitose, pileus from subglobose to hemispherical, fibrillose, broken up into large persistent brown scales, areolate in the centre, margin thick, covered with pyramidal warts; stem fibrillose below, ring very large, areolato-verrucose beneath; gills free, brownish flesh colour."

It is usually gregarious, growing from eight to ten in a dense clump. When mature the pileus is from four to six inches in diameter, and fully an inch thick in the flesh in the centre of the pileus. The younger specimens at the circumference mature gradually as the central specimens are removed, and thus a cluster may continue to furnish fully developed specimens for a week or ten days. The cap differs from that of the common mushroom in being darker in colour, almost purplish brown, with the surface broken up, except just in the centre of the disk, into large conical brown scales, which give to the cap a remarkable appearance, so that it is easily recognised. The stem is thick, exceeding an inch, attenuated downwards, often six or more inches in length, and furnished with a large dependent ring, which is warted on the under side and is thicker than usual in the common mushroom, as is also the separable cuticle of the pileus. When cut through the pileus and stem, (the latter is solid), the flesh is firm, and at first of dirty white, not changing colour, or but slightly, on exposure to the air. It has a slight "mushroomy" odour, and the flavour when cooked has been strongly commended by all who have tasted it, some having declared it superior

to the finest mushroom ever eaten. We have always found it maturing during the last week in August, or the first week in September.

Our experience, and all that we have been able to ascertain regarding it, was published in 1891 in a little volume entitled "British Edible Fungi,"* but we would fain believe that there might be a future in store for such a splendid candidate.

* Kegan Paul, Trench, Trubner & Co.

PARASITIC ROSE CANKER.

A NEW DISEASE IN ROSES.

By H. T. Güssow, F.R.M.S., F.R.H.S.

SPECIMENS of rose twigs showing signs of an obscure injury, said to be spreading, were recently received from Larne, Co. Antrim. The twigs were of various ages. The sender stated that the disease appeared in his Hybrid Tea Roses about two years ago, and is now spreading to the Wichuraianas. As the first specimens were rather dry and therefore unsuitable for the further study of the injury, new ones were requested and a well-chosen series of diseased twigs was obtained, together with some additional notes on the behaviour of the disease. These notes, which are very instructive, are given below:—

"The disease starts first on the one-year-old wood. Leaves are not affected, some specimens bearing leaves this season."

"The plants are about four years old. A specimen Robert Craig has been affected for about two years. The varieties most affected are Ards Rover, Crimson Rambler, Robert Craig, and almost all the Wichuraianas. The disease is more noticeable in wet weather, and spreads to neighbouring plants, especially Wichuraianas."

Unfortunately this disease, like many others, is not readily noticed until far advanced, but it is to be hoped that this report will enable the observant rose-grower to recognize it in its beginning and thus be able to effect a cure.

The accompanying photograph (fig. 38) shows the appearance of the shoots when the disease has reached an advanced stage. These show deep fissures covered with an abnormal growth, which have the appearance of "canker" spots. The bark has burst and for some reason or other the wound has not healed normally, but the callus has continued to grow until badly "cankered" spots result. The single first specimen received agreed exactly in appearance with some illustrations in a paper by Professor Sorauer on Rose Canker (*Zeitschrift f. Pflanzenkrankheiten*, XVII. pp. 22-32 Plate II. 1907). This author, in dealing with a "Rose Canker," attributes the canker spots to frost injury. He describes the injury exceedingly well, but he owns that he failed to produce the characteristic "development of outgrowing cells" (*luxurierende Überwallungen*, p. 27) by exposure of rose trees to artificial frost. He seeks to explain this failure by stating that he "probably had not chosen the right time for his experiments." I will return to this statement of Sorauer's later on, but will first deal with the development of the disease from the evidence of the specimens sent me.

The older twigs were all more or less badly cankered. Those that showed less marked signs of injury, in the form of only a small outgrowth of cells protruding from underneath the split bark, at the same time showed that the cracks were surrounded by plainly diseased tissues of a

dark reddish colour. All showed this with the exception of the worst cankered specimen, where no discolouration of the neighbouring tissue was distinguishable.

Small portions of this reddish tissue were examined under the microscope and were found to be covered with very minute fissures and



FIG. 33.—PARASITIC ROSE CANKER.

globular or oval elevations—the latter still covered by the bark. Higher magnification revealed, in the small fissures of the bark, round black bodies, breaking through the bark with a round opening at the apex. The examination of sections through this part of the bark proved that the round black bodies belonged to a fungus and that the slight elevations were due to bodies of the same nature which had not yet broken through

the epidermis. Mycelium was plainly visible in the surrounding cells and in connection with the black bodies. The cells permeated by the mycelium were dead, and of a reddish colour, this portion being externally visible by the reddish spots on the bark. Having obtained this clue it became necessary to look for the first appearance of the fungus.

As my correspondent correctly says, the disease starts first on the one-year-old wood. He undoubtedly had in his mind the canker spot stage which he describes as the disease. But the pathologist has to go farther and must ascertain the beginning of the injury. Abundant evidence was found of the fungus on the rose twigs, where no fissures or splits of the bark were recognizable and indeed where none existed. In the young green wood more or less confluent red-brown to purplish spots were present on the bark. These spots were found in any position on the bark, and were in no way connected with branches, thorns, or buds; this point is of importance in realizing the nature of the parasite.

A series of twigs showing the beginning and the progress of the disease was selected and has been drawn from nature in the accompanying illustration.

Fig. 84 shows at A a young twig of double natural size. On this twig four of the spots, in the natural specimen reddish brown to purplish, are to be seen. At B the upper portion to the cross line of A is enlarged four times and shows the uppermost spot and part of the one below to be covered with minute cracks. At C a few of these fissures are shown enlarged twenty times, when one can readily see their nature. To the left are three cracks through which the round black fungus bodies show pushing through the bark, with an apical opening. More to the right is one of the minute elevations still covered with the intact bark, while to the extreme right a body is just breaking it. This figure represents the appearance of one of the reddish spots in A or B when looked at from above. If a portion of the bark is cut into thin sections lengthways, and one is examined under the microscope, it appears as in figure D. There are eight fungus bodies present, two growing singly and three in each of two groups; the latter have burst the epidermis, while the former are still covered by it. At E a separated body of the fungus is figured and F represents the same sliced open. In both of these figures, the fine mycelium and the netlike meshes composing the fungus body can be seen. The fungus body contains a large number of exceedingly small spores, and these spores when ripe ooze out of the round opening at the apex of the black conceptacle. At G a small portion of a conceptacle is still more enlarged, and attached to it are a number of fine filaments magnified at H, where the position and the shape of the spores can be plainly seen. At I these spores are highly magnified; they are oval, transparent bodies, which are figured at different stages of germination at J.

The fungus belongs to the genus *Coniothyrium*. Although the species of *Coniothyrium* are generally of saprophytic habit, i.e. living on dead and dying tissues, some are known to "in many cases inhabit living tissues" (Sorauer, *Handb. d. Pflanzenkrankheiten*, 2nd ed. II. p. 385). Thus for instance *Coniothyrium concentricum* (Desm.) Sacc. is the fungus causing the well-known brown spots on leaves of Agave and allied plants. Laubert (cf. *Zeitschrift f. Pflanzenkrankheiten*,

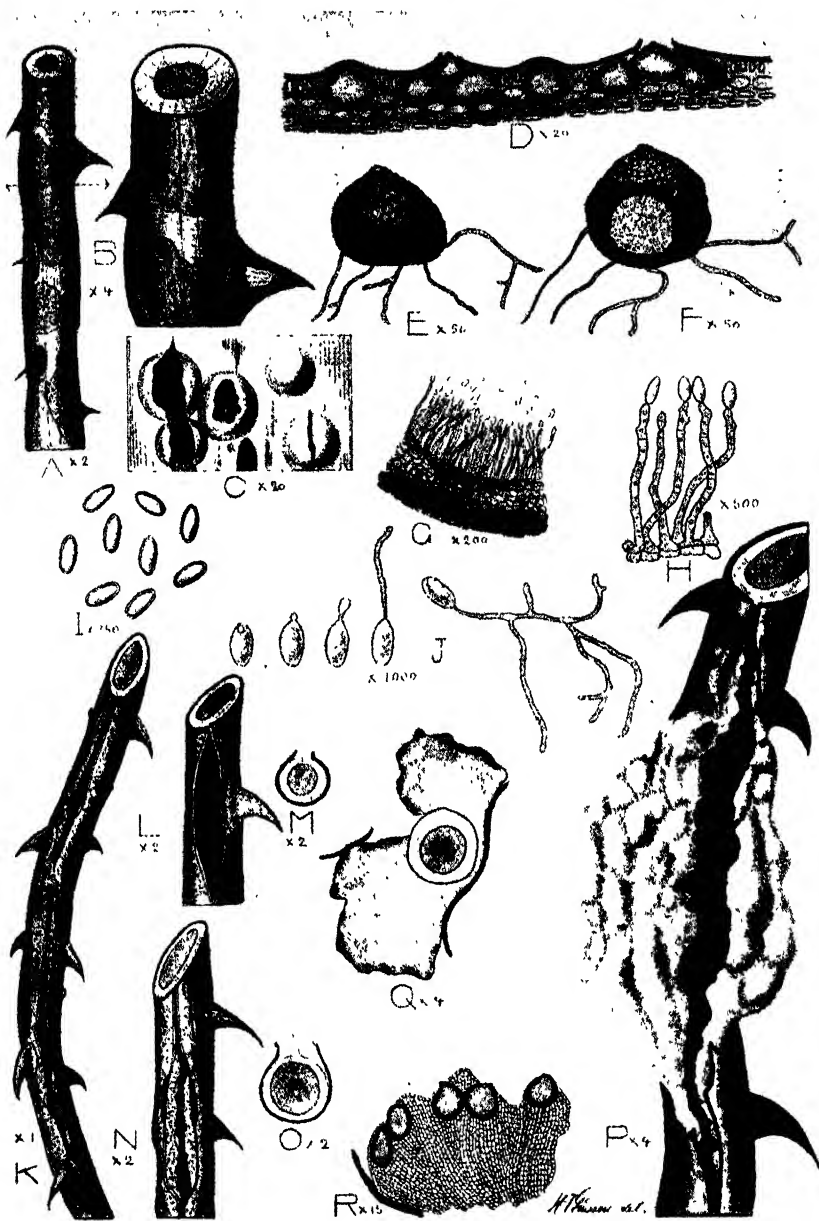


FIG. 34.—CONIOPHTHIUM FÜCKELII ON ROSE STEMS.

- A, Shoot of rose showing a number of spots caused by the rose canker fungus, $\times 2$;
 B, upper part of A showing minute fissures in bark, $\times 4$; C, portion of B showing
 fissures and fungus bodies, $\times 20$; D, section through bark with eight fungus bodies,
 $\times 20$; E, a single fungus body, $\times 50$; F, same as E with a portion cut away, $\times 50$;
 G, portion of fungus body showing spore bearers and spores, $\times 200$; H, basidia and
 spores, $\times 500$; I, ripe spores, $\times 750$; J, germinating spores, $\times 1,000$; K, rose twig
 showing result of fungus attack, long splits in the bark, $\times 1$; L, a fissure in the
 bark, $\times 2$; M, cross-section through same, $\times 2$; N, portion of a shoot showing
 parenchym growth from the edges of the crack, $\times 2$; O, cross-section through
 same, $\times 2$; P, badly cankered shoot, $\times 4$; Q, cross-section through the same, $\times 4$;
 R, part of the cellus containing five fungus bodies, $\times 15$.

XVII. p. 252) has observed a fungus causing the same reddish-brown spots on twigs of roses and has also recorded similar cracks and canker spots previous to 1905. He regarded the fungus he found on these spots as a new species of the genus *Coniothyrium*, giving to it the name *Wernsdorffiae*. In 1905 G. Köck (*Sond. Zeitschr. d. landw. Versuchswesen in Oesterreich*) dealt with the same disease as "a rose parasite new to Austria." He alluded to Laubert's description and name, and there can be no doubt that the malady observed by him is the same as described by Laubert and in the present paper. Köck thinks Laubert's new name unnecessary, as the simple difference in the size of the spores of this form and another of the same genus is not sufficient justification for establishing a new species. He refers the fungus to *Coniothyrium Fuckelii* Sacc. I quite agree with this view, and think that this latter name is correct, as my own measurements of the spores in the Irish specimens practically agreed with the size of the spores of Saccardo's fungus. This fungus is rather common on twigs of various shrubs and trees throughout Europe (Lindau, in Engler and Prantl, *Pflanzenfam.* I. ** p. 364). It has been found, too, that it is only a form of *Leptosphaeria Coniothyrium* Sacc., an ascomycetous fungus. The latter form is frequent on dead twigs of *Rubus*. It is interesting to note that *Leptosphaeria* thus inhabits a member of the rosaceous group, and although I have no evidence, it is not at all unlikely that it occurs on dead rose twigs too.

A good original illustration of a cankered rose twig is found in Krüger and Röric, *Krankh. d. Nutz und Zierpflanzen*, p. 157, Stuttg. 1908, which proves the presence of the disease in Germany. Professors Krüger and Röric adopt Laubert's name, but as the disease is new to this country I have thought it necessary to go into its nomenclature at some length and consider that the fungus causing the parasitic Rose Canker should be known by its first name *Coniothyrium Fuckelii* Sacc.

From the mode of life of the genus to which this fungus belongs, there can be little doubt that its entrance into the tissues of the rose must be through some more or less minute wound in the bark. A growing rose tree supplies a perfect example of a shrub inflicting injuries to its own growing parts as well as to neighbouring plants. For when moved by the wind the prickly branches frequently puncture or tear the epidermis of the leaves and shoots. The small splits and punctures made in this way can always be found on any growing rose tree. In the normal course these very slight injuries will heal immediately, and will appear only as more or less raised spots, but the unhealed wounds are readily taken possession of by certain fungi.

Now taking for granted that from this cause or any other (insects, birds, &c.) small wounds result, the spores of the *Coniothyrium* readily take possession of them and germinate, sending out small mycelial tubes which push their way beneath the bark, where the mycelium ramifies and quickly permeates the tissues around the place of entrance, absorbing the food necessary for its growth from the cell contents of the host. The cells attacked die and the outward sign of the dead cells is seen in the discoloration of the epidermal tissues, giving rise to the reddish-brown spots on the bark of the affected shoot. In the course of its growth the

fungus produces its fructification, in this case the black round conceptacles mentioned before. These conceptacles are formed from the interlacing mycelium and when ripe become hardened and push their heads through the epidermis for the purpose of shedding their spores.

We may now proceed to consider the development of the cankerous spots. What follows now is practically natural development. A normal and healthy branch when growing expands all round in a uniform manner, the bark giving way by means of its elasticity increased by its more or less pronounced perforation by lenticels. But when portions of the bark are killed, as in the case under observation, the natural result will be that where growth is hindered by dead tissues, cracks arise. In this manner the longitudinal cracks in the shoots which are shown in fig. 84, K, result. At L we have one of the more open cracks enlarged; with a cross section through the injured portion at M. Here only the split and gaping bark at the upper portion is to be seen. To understand the further development as shown at N, it is well to call to mind the process which takes place in a plant endeavouring to heal a wound as in cases where branches are cut away from a tree. In a short time from underneath the old bark, a new growth of cells, or callus, arises all round the wound, which in due course and under normal conditions is finally quite covered by the meeting of the over-growing callus in the centre. Practically the same thing occurs before a cutting produces roots. The growth seen to rise from the sound edges of the wound figured at N is really of the same nature as this well-known callus. At O a section through the diseased part of N is shown illustrating the manner in which the callus protrudes from underneath the bark. If the callus would grow completely over the wound and unite in the centre the wound would be healed, but this the fungus prevents. The parasite finds in the callus no resisting epidermis and needs no wound to enable it to effect an entrance into the soft tissue. It makes short work of these cells and the host tries to repair the damage wrought by the fungus by continuing the formation of healing cells. The struggle between the fungus, which kills the tissues, and the host, which by making new callus endeavours to heal the wound, goes on and on, and at last ends in the production of badly cankered spots as shown at P. A section through stem and growth is shown in Q. The woody part is still intact, and remnants of the bark are adhering to the right and a small portion of the old bark covering the stem is balanced on the growth towards the extreme left. All along the edge the black fungus bodies surrounded by darker tissues which are filled by mycelium are to be seen. At R a portion of the callus growth is magnified showing five fruiting conceptacles and the uniform cell chains composing the growth. The absence of any protective covering is also to be noticed, although to the left a small fragment of the old bark still adheres.

Thus far the life of the host is not much impaired, the portions above the place of injury still deriving sufficient nourishment through the sap-conducting vessels of the uninjured portion. Death will only result if a cankerous growth extends all round the stem and thus separates the upper part from communication with the root. How this end is reached is easily explained. We have seen that the callus cells are unprotected and possess thin walls; so that in the case of even a very

slight frost, these tender cells are seriously injured, and the result of a severe frost may be easily imagined. In a canker spot on wood which has passed through some winters, *e.g.* on three-years-old wood, most of



FIG. 35.— PARASITIC CANKER OF BLACKBERRY.

the parenchyma cells are killed, few points of new growth are visible, and the fungus has entirely disappeared, nor are the reddish-brown spots surrounding the cankerous growth present. This is the result of frost, which gives the final blow to the plants. We may here recall Sorauer's

investigation of the rose canker "due to frost" and note that he figures old cankered wood. It would appear that the kind of canker investigated by Sorauer, Laubert, and Köck, and described here are identically the same, only that it depends entirely on the stage of the disease investigated, whether the fungus which is the primary cause, is found or not. Sorauer, himself, failed in the experimental production of the "luxurierende Überwallungen" noted in his own specimen. The fungus attack, however, accounts undoubtedly for all the irritations and complications, which later on are certainly increased by the action of frost.

The observation of my correspondent that the injury is more noticeable during wet weather might be explained by the spongy nature of the parenchyma cells, which readily absorb moisture and thus the growth becomes more pronounced. Another point made by my correspondent—the infective nature of the disease—tends to disprove any such theory as frost injury.

It remains now to say something concerning the treatment of the injury. A careful watch must be kept on roses for the first signs of the primary spots. Probably one cannot do better than carefully paint these spots and a little of the surroundings as soon as observed with a coat of creosoted wood tar. This would kill the spores and prevent the spread of the disease, and at the same time act as a cover to the wound tissues, should the bark split at any time. If, however, the disease is so far advanced that canker spots are present, I would suggest that they be cut clean out with a sharp knife and then a coating of wood tar or even grafting wax applied. Badly cankered twigs and shoots should be cut away altogether and burnt.

A disease of the Blackberry has been investigated which proved to be closely related to the canker of roses. The illustration (fig. 35) shows three large excrescences consisting of parenchymatous cells, and from the investigation of this injury and its history it was evident that the disease



FIG. 36.—*CONIOTHYRIUM TUMAE-FACIENS* GÜSS.

A, perithecia; B, spores.

on the blackberry and the disease on the rose were identical. The fungus, however, was quite distinct, and it has been found necessary to coin a new specific name for it. The fungus belongs to the same genus as that on the rose, and I propose to name it *Coniothyrium tumae-faciens* nov. spec. The other illustration (fig. 36) shows the fruiting bodies of this fungus with some spores, which are magnified to the same degree as those of the rose fungus. The spores are much larger.

The following technical description of the fungus is given as it has not been before described.

Coniothyrium tumae-faciens Güssow, sp. n. Pycnidia scattered, free, conical or globular, with round apical opening, blackish brown, from 800μ to 845μ in diameter; conidiophores long, septate, unbranched, or slightly branched at top, $29-88\mu$ long; conidia unicellular, pale dirty green, short or long ovoid, $5-7\mu \times 3-4\mu$.

Causing large warty excrescences from the size of a pea to that of a walnut on shoots of blackberry. Kent, England.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

IV.—THE INOCULATION OF LEGUMINOUS CROPS.

By F. J. CHITTENDEN, F.L.S.

FOR several years past the question whether the inoculation of the soil with the bacteria which are the cause of the formation of the nodules upon the roots of leguminous plants would lead to increased crops, or to crops of greater value, has offered a fascinating field for experiment, and many forms of inoculating material have been placed upon the market and used with variable results, sometimes successfully, often the reverse. The latest material designed for this purpose in this country has been called "Nitro-Bacterine." It has been widely advertised and boomed in the popular Press, surprising results having, in some places, followed its use. It was, therefore, thought well that it should be tried in the Wisley Garden. A brief summary of the scientific investigations which have led up to the expectation that inoculation of the soil would yield increased crops is first given, and then an account of the trial in the Garden of this particular inoculating material.

HISTORICAL NOTE.*

It was noticed by many ancient writers that a leguminous crop acted in a beneficial manner upon the soil, so that the crop succeeding it was much better than where no leguminous crop had been grown. Pliny, for instance, says, "The bean ranks first among the legumes. It fertilizes the ground in which it has been sown as well as any manure"; and Varro† writes, "Legumes should be sown in light soils: indeed, they are planted not so much for their own crop as for the following crop, since when they are cut and kept upon the ground they make the soil better. Thus the lupine is wont to serve as a manure where the soil is rather thin and poor." The principle here stated has been recognized in all the most general crop rotations followed by farmers, and many different explanations of this beneficial effect have been given. Among them suggestions were not wanting, although they were not backed up by experimental proof, that the leguminous crop improved the soil by taking nutriment from the air and depositing it in the soil through the roots and stubble.‡ It was later found that the soil was not only richer in humus after a leguminous crop had been grown upon it, but that it actually contained more nitrogen than was present when the crop was sown. In 1854, however, Boussingault§ demonstrated the fact that the only source

* A much longer summary is given in the *Bulletin of U.S.A. Dept. Agr., Bureau of Plant Industry*, 71, 1905, and in drawing up the brief account here given I have made free use of the material collected there. Those interested should procure this paper.

† *De Re Rustica*, i. 28.

‡ Thaer, *Rationalle Landwirthsch.* I. Aufl., Bd. 1, 1809.

§ *Mém. de Chim. Agric. et de Physiol.*, Paris.

of nitrogen for plants was the fixed nitrogen supplied through the roots from the soil. Plants were shown to be incapable of utilizing any of the enormous supplies with which they were surrounded in the atmosphere. This conclusion was confirmed by the researches of Lawes, Gilbert, and Pugh* at Rothamsted, and for the vast majority of plants it is held to be true to-day. It was utterly at variance, however, with what was known concerning the behaviour of legumes in the field, and it was sought to reconcile the facts by the suggestion that there was some peculiarity inherent in the legumes themselves. It was not until long after, in 1886, that Hellriegel† announced that these plants unquestionably obtained their nitrogen from the atmosphere, and in 1888 he and Wilfarth‡ showed that leguminous plants were capable of reaching their full development when they were grown in a soil free from nitrogen, but only when they possessed nodules upon their roots. In sterilized soils nodules were not formed and the plants died of nitrogen starvation. Thus the presence of nodules was shown to be coincident with the fixation of nitrogen from the air.

The nodules had been noted long before. Malpighi§ is the first, apparently, to mention them, and he looked upon them as root galls. Others who described them considered them normal structures, while yet others regarded them as a diseased condition of the root. Woronin|| first described their structure in detail, and stated that he had found them to contain small organized bodies, probably bacteria, an announcement that was contradicted by other observers, who looked upon the bacteria-like structures as proteid bodies, but confirmed by Eriksson and others very soon after.

Legumes are seldom without the nodules on their roots either in this country or abroad; indeed, the only leguminous plant on which nodules have never been found is *Gleditschia triacanthos*. Frank showed that the formation of nodules could be prevented by sterilizing the soil in which the plants were grown, thus proving that the nodules owe their origin to microbes living in the soil. This investigator adopted other views later, but Marshall Ward¶ inferred that the nodules "so common on the roots of the bean are due to the action of the fungus the very minute germs of which are all but universally present in the soil," basing his inference partly on the facts that the "tubercles are all but invariably developed within a month when the beans are germinated in sand or soil not previously heated"; (2) they are not developed in media sterilized by heat; (3) the roots may be infected by means of pieces of the old nodules placed among the root hairs; and (4) the infecting hypha may frequently be discovered entering the cortex by means of the root hairs. This view of the origin of the nodules is now generally held.

As we have stated Hellriegel and Wilfarth showed that plants in sterilized soil, lacking nodules, died of nitrogen starvation, but when the

* A very complete and interesting account of these researches is contained in *The Book of the Rothamsted Experiments*, by A. D. Hall, M.A., 1906.

† *Tagebl. 59. Versamml. Deut. Naturf. u. Aerzte*, Berlin, vii. p. 290.

‡ *Zeitschr. Ver. Deut. Rubenz. Indust.*, Nov. 1888.

§ *Opera Omnia, Anatom. Plantarum*, 1687, vol. ii. p. 126.

|| *Mém. Acad. Imp. Sci. Saint-Petersb.* vii. ser. 10 (1886), No. 6.

¶ *Phil. Trans. Roy. Soc. Lond.* Ser. B. 178 (1887), p. 556.

soil was treated with some fresh soil infusion the formation of nodules took place, and the plants grew normally. Many workers confirmed the views put forward by Hellriegel, among them Lawes and Gilbert and Ward, and left no doubt that all legumes are "beneficial to the soil, because the presence of peculiar swellings upon their roots enables them in some way to acquire nitrogen from the air."

In 1888 Beijerinck isolated a bacterium from the nodules, which he called *Bacillus radicumicola*,* and subsequently a large number of other investigators cultivated the organism upon nutrient media, and by these and other researches it became evident that the beneficial effect of leguminous vegetation upon the soil arose from its ability to utilize atmospheric nitrogen for its growth, and that this ability was imparted to it by the bacteria living in symbiosis with it.

Value of the Nodules.—We have already seen that, by reason of the bacteria living in the nodules upon their roots, leguminous plants are able to obtain supplies of nitrogen from the atmosphere, a source which cannot be tapped by other green plants, and that they are, therefore, capable of development in soils devoid of nitrogen in a combined form. The amount of nitrogen taken from the atmosphere and fixed by leguminous crops every year is enormous. In a series of experiments begun at Rothamsted in 1878, and continued for twenty years, it was found that, in the first 27 inches of soil on the plots which had continuously carried leguminous crops, the weight of nitrogen averaged 6,604 lb. to the acre, while in the same quantity of soil from the plots which had carried wheat continuously there was on the average only 5,847 lb., showing a gain of 757 lb. of nitrogen to the acre under the influence of leguminous crops. Furthermore, in addition to this increased nitrogen content in the soil, the crop had annually removed an amount of nitrogen in most cases twice as great as that removed by other crops. For instance, an acre of wheat yielded only 12 lb. of nitrogen annually, while an acre of white clover annually yielded 24 lb.

The work, therefore, done by this partnership between leguminous plants and *Pseudomonas radicumicola*, as the nodule-producing bacillus is now called, is of the utmost importance, and must annually add to the wealth of the world many hundreds of thousands of pounds sterling, for not only is the crop itself able to grow without nitrogenous manures, but it actually enriches the soil in that manurial substance which costs the most to purchase, and causes the succeeding crop to be greatly increased.

Many different views have been promulgated as to where and how the nitrogen is fixed, and the question is by no means definitely settled yet. It is, indeed, only recently that the bacteria have been induced to fix nitrogen when cultivated outside the nodule, and then only under very special conditions. It seems probable, however, that the bacteria themselves fix the nitrogen in the nodules and that the nitrogen fixation does not occur in other parts of the plant. Even if this be admitted there is still very much to be found out concerning the organisms themselves and the manner of their work, and especially, perhaps, concerning the influence of varying conditions on their work and the manner of it.

* *Bot. Zeitung*, xlii. (1888), pp. 725, 741, 757, 781, 797.

It was at one time thought that the bacteria invaded the whole plant, but, as Zinsser * has shown, no nodule bacteria are present either in any parts of the root besides the nodule or in the stem or the leaves, and if the bacteria are inoculated into these parts they do not increase in numbers and die after a time; hence the roots of seedlings and cuttings form nodules only when infected from the soil and not after infection through any other part of the plant.

Conditions under which Nodules are Formed.—The conditions under which nodules are formed on the roots appear to be: (a) the roots must be in contact with infected soil, since only the parts of the root in such contact become infected; (b) nitrates must not be present in any great quantity, for Nobbe and Hiltner † showed that saltpetre prevented the formation of nodules to a greater or less extent; (c) the presence of lime, phosphates, and potash in sufficient quantity; and (d) the presence of a good supply of air in the soil. In this connection it is noticeable that the nodules are very rarely produced upon roots of plants in water cultures, and leguminous plants are very seldom found in wet soils.

Is the same Bacterium capable of forming Nodules on all Species of Leguminous Plants?—This question is of practical importance, since if all legumes can be infected by one and the same organism it is evident that one inoculation of the soil would be sufficient for any and all leguminous plants. Much study has been given to this point, but it cannot be said to be settled yet. Hellriegel found that he obtained an increased yield of peas, clover, vetches, and beans when he watered them with washings from the soil in which peas and clover had grown, but not when he used washings from soil in which seradella (*Ornithopus sativus*) and lupines had grown; and he therefore concluded that there were essential differences between the bacteria from these different legumes. Nobbe, Hiltner, and others came to a similar conclusion, but they did not consider that the differences warranted the view that different species of bacteria were concerned. They practically held the same view as has been expressed by Moore, ‡ that the organisms of the different leguminous plants were all forms of the same species, *Pseudomonas radiculicola*, but that by long-continued growth upon one plant they had become so adapted to that particular partner that they form nodules upon others only with difficulty at the outset, but that after continued multiplication upon a neutral medium they are capable of infecting any leguminous plant. Moore states that, after growing the bacteria obtained from pea nodules for two weeks upon a medium free from nitrogen, he was able to infect various clovers (*Trifolium pratense*, *T. incarnatum*, *T. repens*, *T. alexandrinum*, and *T. hybridum*), melilot (*Melilotus alba*), cowpea (*Vigna catjang*), lucerne (*Medicago sativa*), broad bean (*Vicia Faba*), common bean (*Phaseolus vulgaris*), fenugreek (*Trigonella foenum-graecum*), and vetches (*Vicia lutea*, *V. villosa*, and *V. fulgens*). Only lupines proved refractory. Mazé § considered that there were two groups of nodule-forming organisms—those adapted to live in an acid soil and

* *Jahr. wiss. Bot.*, 1897, Bd. xxx. p. 423.

† *Versuchsst.*, 1893, Bd. xlii. p. 477, and Hiltner, 1896, Bd. xli. p. 161.

‡ *U.S.A. Dep. Agr., Bur. Pl. Ind.*, Bull. 71, pp. 25, 26.

§ *Ann. de l'Inst. Pasteur*, xi. 1897, pp. 145-155.

form nodules on broom, furze, lupine, &c., and a second group adapted to live in an alkaline soil, originating the nodules on most of the commonly cultivated leguminous plants—but this division does not appear to be always strictly in accordance with the facts in practical experience.*

Are Nodules always Beneficial?—It would seem that if the amount of nitrogen obtained by the leguminous plant depends upon the amount fixed by the nodule-forming bacteria, then the greater the development of the bacteria within the nodules the better would it be for the plant. Such a statement appears quite logical at first, but it completely ignores one fact in regard to bacteria, viz. that they are liable under certain conditions to lose a power which, under other conditions, they possessed, although they still retain the power of multiplying at their usual rapid rate. It has been found that the "virulence" of the nodule-forming bacteria varies under different conditions of growth, the "virulence" in this case being measured by their power of fixing nitrogen. Suchting found that the power of nitrogen-fixation by the plants was greatly influenced by the source from which the infecting bacteria were derived, whether they came from the soil, or from crushed nodules, or from pure cultures grown on suitable media.† He found that the virulence of the last was in excess of the other two, while that of the bacteria in the soil-washings was least, but if the bacteria were grown upon unsuitable media their virulence was greatly reduced without diminishing their powers of multiplication. Thus it will be seen that it is possible that at times the number of nodules present upon the roots is anything but a measure of the efficiency of the contained bacteria to fix nitrogen; this essential property depends as well upon the virulence of the bacteria. It is, indeed, possible that the bacteria may be a source of actual loss to the plant in which they are living, and may actually act as parasites instead of partners of the leguminous plant. For if the race of bacteria which has produced the nodules, through cultivation on unsuitable media or from some other cause, has lost its virulence, i.e. its power of fixing nitrogen, the bacteria will be deriving all their nourishment from the plant in which they are living and will return nothing. Furthermore it is conceivable that though the soil be well furnished with nodule-forming bacteria, yet, if it be inoculated with another race showing a greater virulence than that possessed by the normal inhabitants, an increased fixation of nitrogen might result; and conversely, if the race used for inoculating the soil possessed less virulence than the normal inhabitants, the amount of nitrogen fixed might be reduced. It is probable, then, that the source from which the inoculating material is obtained, and the manner in which it is increased for use, are matters of the gravest importance.

Soil Inoculation.—The facts that were brought to light in the late eighties soon led to artificial inoculation of the soil. The first experi-

* It is interesting to note that if there be this distinction in the two forms they must be existing side by side in the Wisley soil, for in the *Pinetum* leguminous plants well provided with nodules on their roots abound, and include furze, broom, and *Ornithopus*, the roots of which are inhabited by bacteria adapted to live in an acid soil, and a variety of clovers and vetches which are harbouring bacteria adapted to live in an alkaline soil, growing in close proximity to them.

† *Centralbl. Bakt.* 2. Abt., 11 (1904), p. 417.

menters used soil from fields which had already grown legumes with which to inoculate newly reclaimed lands or lands upon which legumes had not previously been grown. Salfeld as early as 1887 obtained good results by this method on the Moor Culture Experiment Station, Bremen, but it was only upon such lands that the inoculation produced increased yields. On ordinary lands where rational methods of culture had obtained the results were negative. This method of inoculation is practised in America now when new lands are brought under the culture of soy beans and of lucerne. But this method involves at least two disadvantages, the great expense of transporting large quantities of soil for a considerable distance and the imminent danger of distributing noxious pests and troublesome weeds at the same time.

The first pure culture material used was "Nitragin," put upon the market by the German firm of Höchst, but after extensive trials it was abandoned as not giving the results expected of it. Its originators, Nobbe and Hiltner, afterwards improved it, and it has since given good results in several Continental experiments, even on land which had previously grown leguminous crops. In this case the bacteria were grown and distributed upon a solid gelatin nutrient medium.

In 1904 Moore, of the American Department of Agriculture, developed a method of growing the bacteria in liquid culture media poor in nitrogen. Absorbent cotton wool was soaked in the culture thus obtained, and dried at a low temperature. The bacteria adhered to the wool and in this dried state they were distributed to farmers and gardeners for use. He found that they would remain alive after drying in this manner for a considerable time. Many satisfactory reports were received, but a great number of failures were reported later from other sources, and in this country the material rarely gave increased crops. Some of these failures were attributed to the drying which the bacteria had to undergo. The United States Department has now abandoned sending the cultures out in this form and is distributing them in liquid devoid of nitrogen in hermetically sealed bottles.

In England Professor Bottomley, of King's College, London, has prepared material very similar to that of Moore in America,* and with his material, which he has called "Nitro-Bacterine," the following experiment was carried out.

THE EXPERIMENT.

Plan of the Experiment.—The experiment was planned so as to ascertain whether any benefit was to be derived from the inoculation of leguminous crops under any conditions in such a naturally poor soil as that of the Wisley Garden. One half of the ground set apart for the experiment had for the past four years received ordinary garden cultivation, the crop in 1907 having been celery; this part was divided from the

* Professor Bottomley, in *Seed and Soil Inoculation for Legumes*, writes (p. 8): "When it was decided to send out inoculating material . . . it was necessary, in view of the New York experiments, to find some other medium than cotton wool for distribution of the pure cultures. After a number of experiments it was found possible to obtain a powder preparation of the bacteria." The culture material is sent out in a sealed packet containing cotton wool quite similar to the earlier American method, but in addition a number of dry earth-like particles.

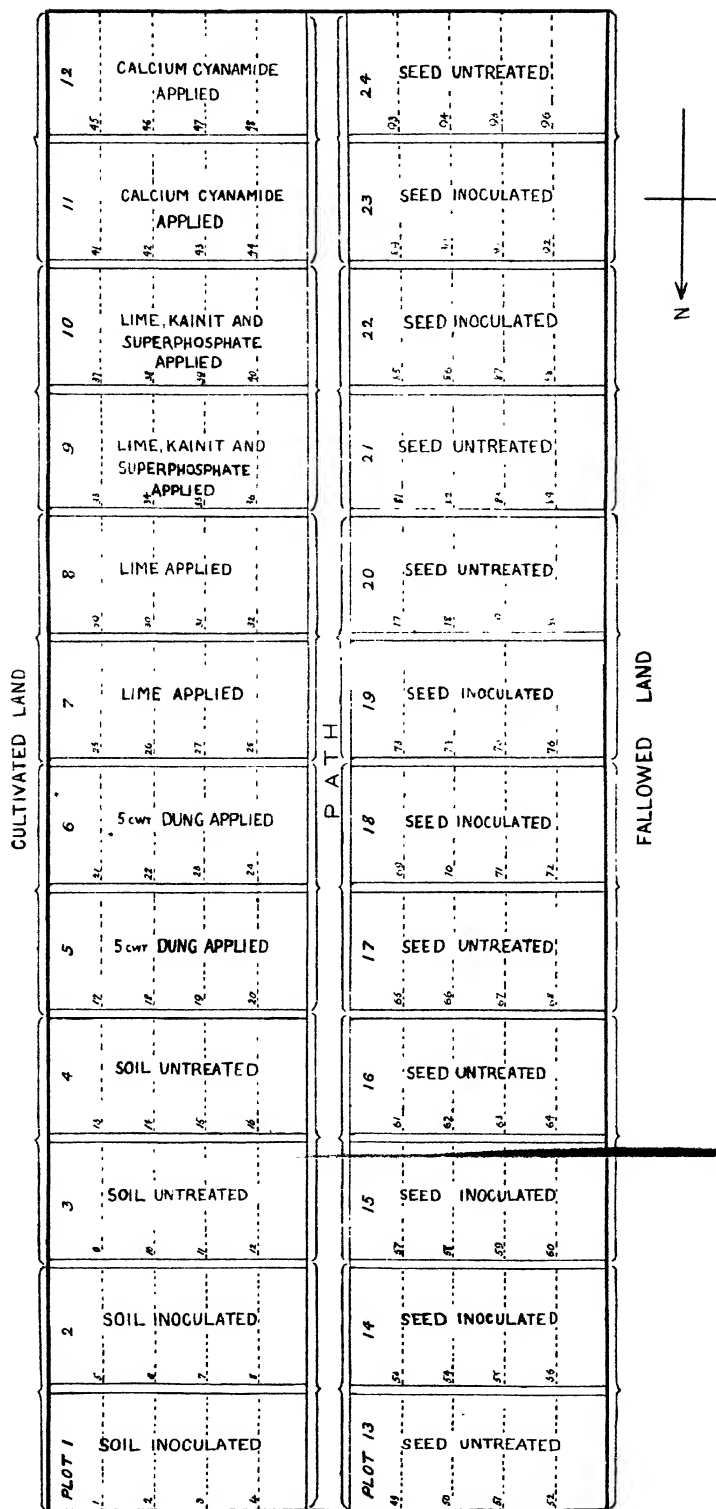


FIG. 37.—PLAN OF THE EXPERIMENT ON THE INOCULATION OF LUMINOUS PLANTS.

The treatment received by soil and seed is to be read straight across the central path. Thus in Plot I. and Plot XIII. the soil was inoculated and the seed was not, and so on. The plots bracketed together are to be compared with one another. They differ only in one receiving inoculated seed, the other uninoculated. The dotted lines show the rows of peas. Each plot measured 36 feet by 15 feet.

other half, which had carried no crop during the preceding year, by a broad path. The fallowed land had been kept constantly free of weeds by continual stirring of the surface soil, and had in 1906 carried a crop of kale.

Each half was divided into twelve equal plots, each measuring 36 feet by 15 feet and having an area of 2 square rods. The plots were separated from one another by paths 1 foot in width. The plots opposite one another on each side of the central walk received similar treatment (see plan, fig. 37). On Plots I., II., XIII., XIV. the soil was inoculated with bacteria in the manner recommended (see below). Plots III., IV., XV., XVI. were not treated in any way. Plots V., VI., XVII., XVIII. received a light dressing of dung at the rate of 10 tons to the acre, in order to test the question whether a slightly increased supply of organic nitrogen would affect the work of the bacteria. Plots VII., VIII., XIX., XX. received a dressing of fresh slaked lime at the rate of half a bushel to the square rod, in order that it might be ascertained whether, if the inoculation on the untreated plots failed to produce any effect, the failure was due to lack of sufficient lime, as it was known that lime is present in very small quantity in the soil. In order to test the question whether potash and phosphates were deficient, Plots IX., X., XXI., and XXII. received a dressing of superphosphate at the rate of 2 cwt. to the acre, kainit at the rate of 2 cwt. to the acre, and lime as on the plots last mentioned. Plots XI., XII., XXIII., and XXIV. received a dressing of calcium cyanamide (which contains lime in a caustic form combined with nitrogen, and so supplies both lime and nitrogen) at the rate of 2 cwt. to the acre, the amount being about equal so far as the nitrogen is concerned to the addition of sulphate of ammonia at the same rate.

Culinary peas were chosen for the experiment, since they probably form the most important leguminous crop in kitchen and market gardens, and the produce is capable of being measured with considerable accuracy; it can be weighed, and one need not therefore depend upon personal estimates of differences in the crop of the different plots, a method of estimation which is always unsatisfactory.

Four rows of peas were sown on each plot, the rows running north and south. Each row measured 15 feet, and there was therefore on each plot 60 feet of peas. Half the peas were inoculated with the bacterial culture (see below) before they were sown and half were not inoculated, the inoculated seed being sown on one plot and the uninoculated seed on the adjoining plot that received similar treatment. There was thus in the aggregate 360 feet of inoculated peas and 360 feet of uninoculated on the well-cultivated ground, and the same amount on that which had been fallowed, the total lengths of the rows of peas in the trial being over a quarter of a mile.

The Soil of the Experimental Plot.—The soil of the Wisley Garden is well described by the Vegetable Committee of the Society, in terms which will be appreciated by all who cultivate garden soil. The soil is a "naturally poor, hungry soil, and requires constant manuring." It overlies the Bagshot sand and is of a very sandy nature, poor in organic matter and containing a very small amount of lime. Indeed, a garden

soil more suitable for the experiment, so far as its natural poverty goes, would have been difficult to find.

The site selected was as nearly level as could be obtained, but had a slight slope from south to north. The depth of soil in the two halves naturally differed considerably. The soil on the part that had received ordinary garden cultivation (the eastern half) had been deeply trenched for celery in 1907, and was therefore much deeper and much better worked

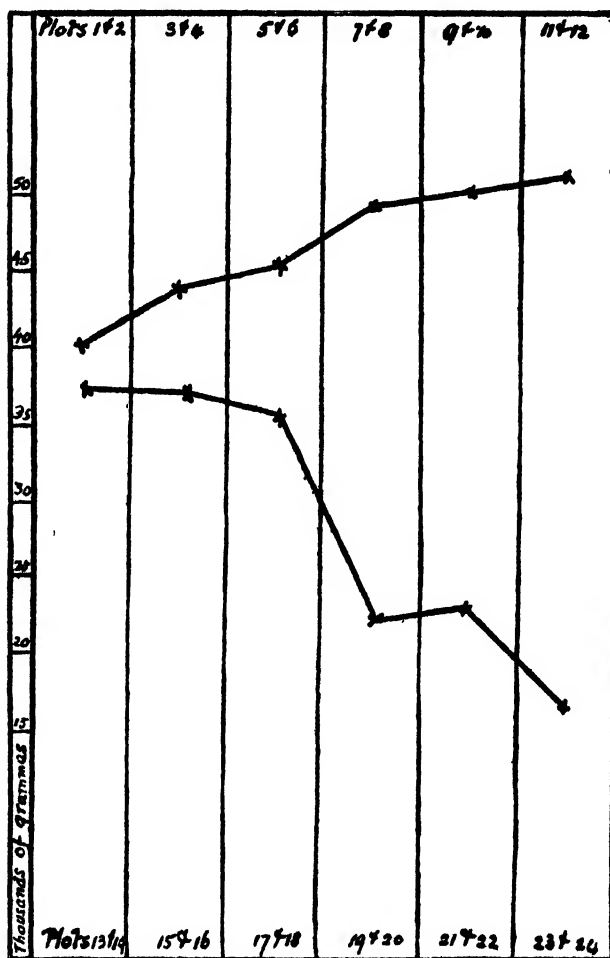


FIG. 38.—DIAGRAM SHOWING THE YIELD ON EACH OF THE PAIRS OF PLOTS.

than the fallowed ground, which had been hoed only through 1907. Both, of course, were dug alike before the sowing of the seed in the spring. One point was particularly noticeable on the fallowed ground: the soil there was appreciably deeper at the northern end, the bottom of the slope, than at the southern end, owing to the washing down of the finer particles of soil during the heavy autumn and winter rains of 1907-8, and this had a marked effect upon the yield in the fallowed land. The diagram (fig. 38) will show graphically what this effect was

This difference in the depth of the soil was not to be found on the cultivated land, for there the crops the land carried had effectually prevented the washing.

As has been repeatedly pointed out in the literature of the subject, the amount of available nitrogen (*i.e.* nitrogen combined in the form of nitrates and salts of ammonia) has a marked influence upon the extent to which leguminous plants avail themselves, so to speak, of the work of the nodule-forming bacteria. When a soil is rich in nitrates, as Nobbe showed, the nodule production is markedly lessened, but becomes greater as the quantity of nitrate is less. In a soil such as that of the Wisley Garden, nitrates are never present in great quantity, for it is so unretentive that water passes through very freely, and carries with it the soluble nitrates.

The quantity of organic matter present in the soil will give some indication of its nature, especially as the organic matter is the source of most of the nitrogen which, after it has been acted upon by bacteria, other plants are able to make use of.

The "cultivated" soil gave the following results:

Air-dry soil	100
Loss on ignition*	3.61
Loss on drying at 100° (= water)	1.00
	<hr/>
	2.61 per cent.*

and the fallowed soil:

Air-dry soil	100
Loss on ignition*	2.65
Loss on drying at 100° (= water)	1.32
	<hr/>
	1.33 per cent.*

* These figures represent organic matter, water of combination, salts of ammonia, &c., and it will be seen from them that the amount of organic matter in the cultivated land as well as in the fallowed land is very small indeed.

Professor Bottomley states in his pamphlet (*l.c.* p. 10): "Inoculation is useless when the legumes usually grown are producing high yields and the roots show nodules in abundance." It is worthy of note, therefore, that in the Wisley Garden peas and beans have not as a rule produced high yields, so that in this direction also the garden offered a well-suited place for the experiment. Further, no leguminous crop has been grown on the site on which the experiment was conducted since the garden came into the possession of the Society, and probably not for some years before that. Nor have leguminous weeds been allowed to grow, since the land is continually hoed, and no weeds succeed in maintaining their existence for any length of time.

On the other hand, however, many leguminous plants occur spontaneously in remarkable numbers in the uncultivated parts of the garden; in one part, for instance, both the furze (*Ulex europaeus*) and the brom (*Cytisus scoparius*) grow well, and, in addition, the ground in some parts is carpeted with the bird's-foot (*Ornithopus perpusillus*), the bird's-foot trefoil (*Lotus corniculatus*), vetches of various kinds (*Vicia sepium*, *V. angustifolia*, *V. sativa*, *V. hirsuta*, and *V. tetrasperma*), clovers (*Trifolium repens*, *T. hybridum*, *T. pratense*, *T. procumbens*, and *T.*

minus), black medick (*Medicago lupulina*), and others, while in the garden proper lupines of various kinds, species of *Lathyrus* and *Vicia*, and other ornamental leguminous plants grow well, some so well that they are apt to become a nuisance unless they are constantly kept within bounds. And these, growing on so poor a soil, are abundantly provided with nodules.

The question as to whether the bacteria which are capable of producing nodules upon one species of leguminous plant are also capable of producing them upon others has been alluded to above, but it is interesting to note that in every case where soil from different parts of the garden was placed in carefully cleaned pots, which had never been used for growing leguminous plants, and pea or broad bean seeds sown in it, nodules were produced upon the roots of the seedlings, showing that the nodule-bacteria were universally present throughout the soil of the garden, even in that which, so far as all knowledge and inductive reasoning would lead us to conclude, had not been disturbed for a very long period.

Seed Used.—As past experience showed that certain types of peas did not grow as well as others on the Wisley soil, for this experiment four varieties were selected, representing four different types of peas. They were 'Ne Plus Ultra,' 'Duke of Albany,' 'Telegraph,' and 'Maincrop.'

The seed used was kindly presented to the Society for the purpose by Mr. A. W. Sutton, V.M.H.; and all, with the exception of 'Maincrop,' which showed a germination capacity of 88 per cent., gave the excellent germination capacity of from 96 per cent. to 98 per cent.

The same weight of peas (60 grammes) was sown in each row of 15 feet. The number of seeds that made up the lots of 60 grammes of the same variety varied within rather narrow limits, and of course the number of seeds required to weigh 60 grammes in the different varieties varied very considerably, but it was thought better to take a definite *weight* of seed rather than a definite *number*, for it has been shown repeatedly that a heavier seed produces a larger and better developed plant than a smaller seed of the same variety.

It may be noted that it was found later that, for one cause or another, only about one-third of the seeds had produced plants that reached a full development, and that in certain plots the number of plants fell far below that of the others of the same variety. Attention is drawn to this in considering the results obtained.

Inoculation.—Two methods of inoculation were tried, alone and in combination. In Plots I., II., XIII., and XIV. the soil was inoculated, but in the other plots it was not inoculated, while the seed sown on Plots II., III., VI., VII., X., XI., XIV., XV., XVIII., XIX., XXII., and XXIII. had been first inoculated, and that sown on the other plots was used just as it was received from Messrs. Sutton.

The inoculation material was kindly presented by Professor Bottomley, and was received directly from him on March 2, the broth being made on the same day. The instructions for making the broth were as follows:—

"Take a bucket or tub, clean and scald it out thoroughly, place in it one gallon of good pure water (preferably rain water which has been well boiled and allowed to cool), add the contents of package No. 1, and stir until the salts are dissolved. Then carefully open

package No. 2, and drop the enclosed wool and powder into the solution, giving another stir. Cover the tub with a clean moist cloth, to protect the solution from dust, and keep in a warm place (*e.g.* by the side of the fire), *but temperature must not exceed 75° to 80° Fahr.*

"After twenty-four hours add the contents of package No. 3, again stirring, and allow the mixture to stand until it turns cloudy. This will take place in from twenty-four to thirty-six hours if the temperature is suitable. If the solution has been kept cold further time should be given (not exceeding one or two days) for sufficient growth of the bacteria to produce the cloudiness, as it is useless for inoculating purposes until it turns cloudy."

These directions were rigidly adhered to.

The contents of packet No. 1 (which contained small quantities of cane sugar, potassium phosphate, and magnesium sulphate) were added to one gallon of recently boiled distilled water, contained in a glazed earthenware vessel, which was scalded out just previous to being used. When this was quite dissolved the contents of packet No. 2 (the cotton wool and earth-like particles containing the germs) were added, and well stirred with a glass rod; the whole was then covered with a clean towel, to exclude all dust and light, and stood in a propagating pit, where the temperature was maintained at 70° Fahr. Twenty-four hours afterwards the contents of the third packet (ammonium phosphate) were added, and stirred until the whole was dissolved, the cloth was replaced, and the vessel left under the same conditions as before. The broth was not very cloudy at the end of forty-eight hours from the time of starting, but by the end of sixty-four hours (on March 5) it had become quite cloudy, owing to the development of prodigious numbers of bacteria, and it was then used.

Inoculation of the Soil.—Some soil which had been previously dried somewhat in the air was taken and well moistened with some of the cloudy culture, diluted with its own bulk of water. This was mixed thoroughly with a further bulk of soil, so that the whole formed a mass that could be easily spread with a spade over the four plots which were to be inoculated (and which had already been dug). This inoculated soil after spreading was well raked in.

Inoculation of the Seed.—The seed had been previously weighed out into lots of 60 grammes' weight, and forty-eight lots were now inoculated (March 5). Each lot was placed separately in a small sieve and dipped into the cloudy broth, so that the coat of every seed was thoroughly wetted. The process took but a very short time in each case. When the superfluous moisture had been drained away the seeds were spread out in separate lots in the laboratory to dry, the blinds of the room being drawn during the drying process, as light has been found to be injurious to the bacteria.

The weather was not suitable for the sowing of the seed for a few days after the inoculation, and the seeds were stored meanwhile in opaque paper bags, numbered to correspond with the rows in the experimental plots.

When the very similar American cultures were tried in this country, and met with repeated failures, the serious objection was raised that the cultures were dead before they were received. This was probably true in some cases, but not in all. In one extensive series of trials that came under my notice they were certainly capable of producing nodules. In order to be perfectly certain that the organisms supplied were in good condition, and capable, under proper conditions, of producing nodules, peas were sown both with and without inoculation in soil which had been pasteurized by heating for one hour at 90° Cent., a temperature sufficiently high to kill all the nodule-producing bacteria. Nodules were plentifully produced in the pots in which the inoculated peas were sown, but this was not the case in the pots where the uninoculated seed was sown. In other pots the soil was inoculated after pasteurization, by watering with the diluted inoculating broth, and here again nodules were freely produced on plants raised from uninoculated seed. There is thus no question as to the viability of the culture used.

The seeds used in these pot cultures were inoculated at the same time and in the same way as the seed sown in the garden trial.

Sowing the Seed and the Growth of the Plants.—All the seed was sown on the afternoon of March 10, in drills of equal depth throughout. The first sign of the seedlings appearing above the ground was noticed on April 6, and all the plots had the plants up within a day or two. There was no advantage or disadvantage in the inoculated over the uninoculated plots. The weather was, on the whole, favourable to the growth of the plants, and they grew on without check. Following a very hot spell at the beginning of May there was an attack of Pea Weevil (*Sitona lineatus*), but the plants were by that time too well grown to suffer much and all suffered alike. All the rows came very well with the exception of 'Maincrop,' which was rather patchy. Examination showed that a considerable number of the seeds of this variety had rotted in the soil and had not attempted germination. By the middle of May all the rows had wire stretched along them to support the plants, and by June 4 some of the plants of 'Telegraph' and 'Duke of Albany' were in flower.

The trial was seen by many persons during its progress, and none were able to observe at any time any marked difference between an inoculated plot and the adjoining uninoculated plot, which had otherwise received similar treatment.

Method of Estimating the Result.—In order to get an accurate estimate of the crop on the several plots the produce of each of the ninety-six plots was picked separately when it had attained a marketable size. Each row was picked over, as a rule, four times, the last time so as to strip off every pod. Each picking of one variety on one half of the trial ground was completed within one day. The pods from each row were counted and weighed as soon as gathered, then shelled, the shelled peas being also weighed. By this method, which involved the shelling of about 7½ cwt. of peas and weighing them in quite small quantities, we were not only able to ascertain the total crop from each row, but also to find out whether any showed earlier maturity than others, and whether, on the whole, the pods were better filled in one plot than in another.

THE RESULT.

Cultivated Ground.—As already pointed out, the experiment was carried out in two sections, which differed considerably from one another, and it will be best to consider them separately, taking the series on the cultivated ground first. It may be noted at the outset that the roots of the plants on *all* the plots were found to be well supplied with nodules.

TABLE A.

* PRODUCE FROM PLOTS I. AND II. SEED INOCULATED, BUT NOT MANURED.

Variety	Plot I. Seed not inoculated			Plot II. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra . . .	615	5,003	2,421	611	4,793	2,258	-1	-5	-7
Duke of Albany . .	496	5,363	1,734	489	5,135	1,740	-2	-5	0
Telegraph . . .	603	6,044	2,212	623	6,035	2,210	+3	-1	+1
Maincrop . . .	561	4,242	2,116	504	4,144	1,967	-11	-3	-8
Totals . . .	2,275	20,652	8,483	2,227	20,107	8,205	-3	-3	-4

* All weights are given in grammes, except in Table P.

Here the inoculation of the seed yielded no increase of crop when the soil had been inoculated previously, but instead there was a slight decrease, amounting in the produce as it comes to the market from the whole plot to about 4 per cent. This decrease was seen in all the varieties with the exception of 'Telegraph,' where the difference was very slight.

TABLE B.

PRODUCE FROM PLOTS III. AND IV. SOIL NEITHER INOCULATED NOR MANURED.

Variety	Plot IV. Seed not inoculated			Plot III. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra . . .	692	5,602	2,691	583	4,542	2,141	-15	-19	-20
Duke of Albany . .	605	6,767	2,308	558	6,150	2,044	-8	-11	-13
Telegraph . . .	805	7,722	2,883	596	5,630	2,120	-26	-28	-26
Maincrop . . .	623	4,958	2,421	474	3,185	1,874	-24	-35	-23
Totals . . .	2,725	25,549	10,303	2,211	19,507	8,179	-19	-23	-21

In this case the decrease from the inoculated seed was much more marked, being over 20 per cent., and further the decrease occurred in every variety, varying from 11 per cent. in 'Duke of Albany' to 35 per cent. in 'Maincrop.'

A comparison of the produce from these four plots, which are strictly comparable with one another, is very interesting. The total yield from

the plot which received no treatment at all beyond what it would receive in ordinary garden cultivation, neither the soil nor the seed being inoculated, was 2,752 pods, weighing 25,049 grammes and containing 10,808 grammes of peas. When the soil alone was inoculated the yield was 2,275 pods (a decrease of 17 per cent.), weighing 20,652 grammes (a decrease of 18 per cent.), containing 8,488 grammes (a decrease of 18 per cent.). When the seed alone was inoculated the yield was 2,211 pods (a further decrease of 2 per cent.) weighing 19,507 grammes (a further decrease of 5 per cent.), containing 8,179 grammes of peas (a further decrease of 3 per cent.). When both soil and seed were inoculated the yield was about the same as in the last case, viz. 2,227 pods (a decrease of 19 per cent. compared with the untreated plot), weighing 20,107 grammes (a decrease of 20 per cent.), containing peas weighing 8,205 grammes (a decrease of 21 per cent.).

Does this mean that in this poor garden soil inoculation of the seed or soil may actually lead to a decreased yield when this particular inoculating material is used? The only alternative is to suppose that the inoculation had no influence at all, but that different plots as nearly similar as it is possible to get may give crops varying as much as 23 per cent., while the variation in the different rows of the same variety may be as much as 35 per cent. in one case and 28 per cent. in another.

Turning now to the two plots which received a very light dressing of dung we have yields as follows :—

TABLE C.

PRODUCE FROM PLOTS V. AND VI. SOIL NOT INOCULATED, BUT MANURED WITH DUNG AT THE RATE OF TEN TONS TO THE ACRE.

Variety	Plot V. Seed not inoculated			Plot VI. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		GRS.	GRS.		GRS.	GRS.			
Ne Plus Ultra .	703	5,903	2,833	712	5,723	2,595	+ 1	- 4	- 9
Duke of Albany	485	5,633	1,926	666	7,348	2,480	+ 36	+ 30	+ 28
Telegraph .	756	7,283	2,750	789	7,711	2,946	+ 4	+ 5	+ 7
Mannerop .	612	4,855	2,144	565	4,399	2,159	- 8	- 10	0
Totals .	2,556	23,674	9,653	2,732	25,181	10,180	+ 7	+ 6	+ 5

There is thus a difference in favour of the inoculated seed of 6 per cent. in the weight of the pods (7 per cent. in the number of the pods and 5 per cent. in the weight of the peas), but this, we have seen, is well within the margin of difference which might have been expected. Furthermore, it would be quite contrary to previous experience to find that the addition of farmyard manure helped the work of the bacteria, although, probably for another reason altogether, it is a usual experience to find that the addition of farmyard manure leads to an increase in the yield of peas.

The next two plots were for the purpose of ascertaining whether or not the presence of a greater amount of lime than is normal in our soil would allow the inoculation to show to advantage here. The yields are shown in Table D.

TABLE D.

PRODUCE FROM PLOTS VII. AND VIII. SOIL NOT INOCULATED, BUT DRESSED WITH LIME AT THE RATE OF FORTY BUSHELS TO THE ACRE.

Variety	Plot VIII. Seed not inoculated			Plot VII. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
Ne Plus Ultra .	638	grs. 5,006	grs. 2,297	786	grs. 6,217	grs. 3,004	+ 23	+ 25	+ 30
Duke of Albany .	592	6,799	2,281	531	5,884	1,923	- 11	- 14	- 16
Telegraph .	760	7,118	2,580	795	7,863	2,918	+ 4	+ 10	+ 12
Maincrop .	696	5,636	2,523	616	4,702	2,235	- 12	- 17	- 13
Totals .	2,686	24,559	9,681	2,728	24,666	10,080	+ 1	0	+ 4

It would seem that there is already a sufficient quantity of lime in the soil for the work of the bacteria there, for although there was an increase in two cases there was a decrease also in two cases, and the total yields scarcely differ from one another, the balance in favour of inoculation being less than 1 per cent. Here again the inoculation was of no value.

The next two plots will show whether the reason of failure hitherto has been due to lack of potash and phosphoric acid in the soil.

TABLE E.

PRODUCE OF PLOTS IX. AND X. SOIL NOT INOCULATED, BUT DRESSED WITH LIME, KAINIT, AND SUPERPHOSPHATE.

Variety	Plot IX. Seed not inoculated			Plot X. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
Ne Plus Ultra .	784	grs. 6,405	grs. 3,010	744	grs. 6,026	grs. 2,755	- 6	- 3	- 9
Duke of Albany .	592	6,857	2,308	547	6,133	2,144	- 8	- 14	- 8
Telegraph .	820	8,072	2,837	784	7,375	2,505	5	- 9	- 8
Maincrop .	662	5,683	2,533	476	3,711	1,663	- 30	- 35	- 37
Totals .	2,858	27,017	10,788	2,551	23,245	9,067	- 12	- 14	- 16

Here we find a reduction in the crop from the inoculated seed in every variety, and quite a marked one. From this it is evident that the failure of the inoculation to produce beneficial results in other cases was not due to lack of sufficient potash and phosphoric acid in the soil.

On the last two plots calcium cyanamide was put, increasing the quantity both of lime and nitrogen in the soil. Table F shows the yield from these two plots.

TABLE F.

PRODUCE FROM PLOTS XI. AND XII. SOIL NOT INOCULATED, BUT DRESSED WITH CALCIUM CYANAMIDE.

Variety	Plot XII. seed not inoculated			Plot XI. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pod	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra .	773	6,924	3,122	826	6,986	3,251	+ 6	- 0	+ 4
Duke of Albany	610	6,846	2,108	550	6,072	2,041	- 10	- 12	- 4
Telegraph.	802	7,892	2,709	808	7,559	2,720	0	- 5	0
Maincrop .	529	4,080	1,757	558	4,809	2,008	+ 5	+ 19	+ 14
Totals .	2,714	25,692	9,696	2,742	25,417	10,020	+ 1	- 2	+ 3

Here again the result is practically the same in the two plots.

If we now take the totals of the six plots on which the seed was inoculated, and compare with the totals of those where the seed was not inoculated, we have :—

TABLE G.

COMPARISON OF THE PRODUCE FROM THE UNINOCULATED PLOTS WITH THAT FROM THE INOCULATED PLOTS.

Variety	Seed not inoculated			Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra .	4,205	34,843	16,374	4,262	34,287	16,004	+ 1	2	- 2
Duke of Albany	3,380	38,265	12,665	3,341	36,722	12,372	- 2	- 4	- 3
Telegraph	4,546	44,131	15,971	4,395	42,164	15,449	- 4	- 5	- 4
Maincrop .	3,683	29,404	13,594	3,193	24,950	11,906	- 13	- 15	- 13
Totals .	15,814	146,643	58,604	15,191	138,123	55,731	- 4	- 6	- 5

In the case of every variety, as well as in the aggregate, the weight of the produce from the inoculated seed was less than that from the untreated, though in one case there was a slight increase in the number of pods. This consistent though slight decrease is possibly without significance, but the fact is very clearly demonstrated that inoculation is likely to result in no benefit whatever in a thoroughly well cultivated garden soil, even when the soil is as poor as that of Wisley.

In the last table (Table G) the totals given included those from the soil that had been inoculated (see Table A). and if we leave these out the result tells precisely the same tale, the totals being, from the inoculated seed, 13,539 pods, weighing 125,991 grammes, and containing 50,121 grammes of peas, and, from the inoculated seeds 12,564 pods, weighing 118,016 grammes, containing 47,526 grammes of peas. Thus there was a decrease from the inoculated seed of 5 per cent. in the number of pods,

7 per cent. in their weight, and 6 per cent. in the weight of the peas they contained, and the decrease was shown consistently by every variety.

By dividing the number of pods into the total weight of the pods the average weight of a pod may be obtained. It will be seen that it scarcely varies in the two cases, though that from the inoculated is slightly the less, while the average weight of the peas contained in the pods is also slightly less than that from the uninoculated.

Fallowed Ground.—Turning now to the fallowed ground, where a similar series of plots was arranged, we find the result complicated by the gradual fall off in the depth of the soil towards the top of the series of plots (fig. 38). This factor must be borne in mind in considering the tables which follow. Another point of importance, interfering with the result of this part of the trial, was the very unequal number of plants, in the rows of 'Maincrop' particularly. In order to show where the latter point interfered with the result in a marked manner, where the difference in the number of plants was great, the number is given as a footnote to the table.

TABLE H.

PRODUCE OF PLOTS XIII. AND XIV. SOIL INOCULATED, BUT NOT MANURED.

Variety	Plot XIII. Seed not inoculated			Plot XIV. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		<i>grs.</i>	<i>grs.</i>		<i>grs.</i>	<i>grs.</i>			
Ne Plus Ultra . . .	643	5,222	2,543	604	4,952	2,585	- 7	- 6	+ 1
Duke of Albany . . .	388	4,261	1,360	463	5,045	1,630	+ 19	+ 18	+ 19
Telegraph . . .	529	4,893	1,710	578	5,753	2,045	+ 9	+ 17	+ 19
Maincrop . . .	487	3,428	1,562	527	3,875	1,928	+ 8	+ 13	+ 23
Totals . . .	2,047	17,804	7,175	2,172	19,625	8,188	+ 6	+ 10	+ 14

In this case there is, in the aggregate, a gain of 10 per cent. in the inoculated plot, while, with the exception of 'Ne Plus Ultra,' all the weighings show an increased yield from the inoculated seed.

TABLE I.

PRODUCE OF PLOTS XV AND XVI. SOIL NEITHER INOCULATED NOR MANURED.

Variety	Plot XVI. Seed not inoculated			Plot XV. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		<i>grs.</i>	<i>grs.</i>		<i>grs.</i>	<i>grs.</i>			
Ne Plus Ultra . . .	646	5,260	2,531	628	5,029	2,448	- 3	- 5	- 4
Duke of Albany . . .	332	3,671	1,062	363	4,071	1,230	+ 9	+ 10	+ 21
Telegraph . . .	580	5,972	2,074	631	6,378	2,225	+ 8	+ 6	+ 7
Maincrop* . . .	325	2,418	1,115	519	4,126	2,000	+ 59	+ 70	+ 78
Totals . . .	1,883	17,321	6,782	2,141	19,604	7,963	+ 13	+ 13	+ 17

* Number of plants from non-inoculated seed, 85; number from inoculated seed, 46.

Here again there is a gain from the inoculated over the uninoculated seed amounting in the aggregate to 18 per cent., but a considerable part of this gain is more apparent than real, on account of the variation in the number of plants of 'Maincrop.' If this variety be ignored the gain is in the aggregate only 3 per cent.

These four plots may be compared as in the series on the cultivated land, and we find that the smallest yield was on the untreated plot. When the soil alone was inoculated there was a gain of 8 per cent. in the number of pods, 2 per cent. in their weight, and 5 per cent. in the weight of the peas they contained. When the seed alone was inoculated there was a gain of 18 per cent. in the number and weight of the pods, and 17 per cent. in the weight of the peas. When both seed and soil were inoculated the gain over the untreated plot was 15 per cent. in the number of pods, 18 per cent. in their weight, and 20 per cent. in the weight of peas they contained.

The small number of plants of 'Maincrop' on the untreated plot interferes with the comparison, and if we leave this variety out entirely we find the results are much more even (Table J).

TABLE J.

TOTAL AND COMPARATIVE WEIGHTS OF PRODUCE OF THREE VARIETIES ON PLOTS XIII., XIV., XV., XVI.

—	No. of pods	Wt. of pods	Wt. of peas	Percentage difference from untreated plot		
				No. of pods	Wt. of pods	Wt. of peas
Plot XIII.						
Soil only inoculated . . .	1,560	14,376	5,613	0	— 1	— 1
Plot XIV.						
Soil and seed inoculated . .	1,645	15,750	6,260	+ 5	+ 5	+ 10
Plot XV.						
Seed only inoculated . . .	1,622	15,478	5,963	+ 4	+ 3	+ 4
Plot XVI.						
Untreated	1,558	14,903	5,667		—	..

Taking these three varieties alone then, we find that when the soil alone was inoculated there was a slightly diminished crop, while when the seed alone or both the soil and seed were inoculated the return was only slightly increased.

Taking these facts into consideration, and bearing in mind the fall off in the soil towards the upper end of the series, we cannot but conclude that here again there was no advantage derived from inoculation.

TABLE K.

PRODUCE FROM PLOTS XVII. AND XVIII. SOIL NOT INOCULATED, BUT MANURED
WITH DUNG AT THE RATE OF TEN TONS TO THE ACRE.

Variety	Plot XVII. Seed not inoculated			Plot XVIII. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra .	630	5,244	2,494	628	5,125	2,481	-1	-3	-1
Duke of Albany .	390	4,423	1,309	323	3,616	1,202	-17	-19	-9
Telegraph .	599	5,998	2,098	512	5,249	1,785	-14	-13	-15
Maincrop* .	506	3,880	1,785	304	2,314	1,045	-40	-41	-42
Totals .	2,125	19,545	7,686	1,767	16,304	6,513	-17	-17	-16

* Number of plants from non-inoculated seed, 54; number from inoculated seed, 35.

Here the difference in the number of plants in the rows of 'Maincrop' interferes with the exact comparison between the two plots, and the total decrease in the crop shown by the table is too great. Every variety, however, showed a diminished yield from the inoculated plot, and evidently here inoculation was rather detrimental than the reverse.

TABLE L.

PRODUCE FROM PLOTS XIX. AND XX. SOIL NOT INOCULATED, BUT DRESSED WITH
LIME AT THE RATE OF 40 BUSHELS TO THE ACRE.

Variety	Plot XX. Seed not inoculated			Plot XIX. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra .	346	2,665	1,200	475	3,901	1,831	+37	+46	+52
Duke of Albany .	149	1,529	472	299	2,923	919	+100	+91	+94
Telegraph .	534	4,580	1,498	467	4,938	1,639	-13	+7	+10
Maincrop .	130	959	454	96	679	313	-27	-30	-38
Totals .	1,159	9,733	3,624	1,337	12,441	4,702	+15	+27	+29

Extraordinary variations are apparent in the results from these plots, due in the main at least to variations in the numbers of plants in the rows. We have not the figures for the varieties 'Duke of Albany' and 'Telegraph,' owing to an accident, but the number of plants of 'Ne Plus Ultra' in the non-inoculated row was 24; in the inoculated, 38; of 'Maincrop' in the non-inoculated row, 38; in the inoculated row, 24.

As figures stand it would appear that if lime were added to the soil then the inoculation would have been very beneficial (but there are contradictory figures as well). If this be true then we should find that inoculation was beneficial also in the next pair of plots, where also lime was added.

TABLE M.

PRODUCE FROM PLOTS XXI. AND XXII. SOIL NOT INOCULATED, BUT DRESSED WITH LIME, POTASH, AND SUPERPHOSPHATE.

Variety	Plot XXI. Seed not inoculated			Plot XXII. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra . . .	526	4,027	1,931	402	2,916	1,392	-29	-28	-28
Duke of Albany . .	206	1,969	635	157	1,460	480	-24	-26	-25
Telegraph . . .	521	5,146	1,727	512	5,092	1,677	-2	-2	-3
Maincrop* . . .	274	2,107	923	98	674	293	-65	-69	-69
Totals . . .	1,527	13,249	5,216	1,169	10,142	3,842	-24	-24	-27

* Number of plants in non-inoculated row, 52; number of plants in inoculated row, 15.

Here again the decrease is probably much greater than it ought to be owing to variation in the number of plants in a row, especially in 'Maincrop,' but every variety shows a decrease, and it is evident that the difference shown in Plots XIX. and XX. is a purely fictitious one so far as inoculation is concerned. It is obvious that the addition of lime does not yield better results with the inoculating material in our soil, nor is the soil so deficient in potash and phosphates as to be incapable of maintaining the nodule bacteria.

TABLE N.

PRODUCE FROM PLOTS XXIII. AND XXIV. SOIL NOT INOCULATED, BUT DRESSED WITH CALCIUM CYANAMIDE.

Variety	Plot XXIV. Seed not inoculated			Plot XXIII. Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
		grs.	grs.		grs.	grs.			
Ne Plus Ultra . . .	301	2,082	951	231	1,602	677	-24	-23	-29
Duke of Albany . .	66	475	163	104	738	243	+57	+55	+49
Telegraph . . .	467	4,440	1,468	489	5,265	1,665	+4	+18	+12
Maincrop* . . .	180	1,293	575	137	921	411	-24	-29	-29
Totals . . .	1,014	8,290	3,157	961	8,526	2,996	-6	+2	-6

* Number of plants in non-inoculated row, 38; number of plants in inoculated row, 35.

Here the variations in the total yield are slight, although in the separate varieties they are great.

If we now take the totals of the six plots on which the seed was inoculated, and compare with the totals of those where the seed was not inoculated, we have—

TABLE O.

COMPARISON OF THE PRODUCE FROM THE UNINOCULATED PLOTS WITH THAT FROM THE INOCULATED PLOTS.

Variety	Seed not inoculated			Seed inoculated			Percentage increase or decrease		
	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas	No. of pods	Wt. of pods	Wt. of peas
Ne Plus Ultra .	3,092	24,500	11,650	2,968	23,525	11,414	-5	-4	-3
Duke of Albany .	1,531	16,328	5,001	1,709	17,853	5,764	+11	+9	+15
Telegraph .	3,230	31,029	10,575	3,189	32,675	11,036	-2	+5	+4
Maincrop .	1,902	14,085	6,414	1,681	12,589	5,990	-12	-11	-7
Totals .	9,755	85,942	33,640	9,547	86,642	34,204	-3	0	+1

In the aggregate there is scarcely any difference in the produce from the two sets of plots, while, considering the varieties separately, two gave a greater yield in weight of produce and two a less. On the whole, therefore, it cannot be said that, even on this land which had not received even such good attention as an ordinary garden soil, inoculation with "Nitro-Bacterine" is likely to prove of any benefit.

If we leave out of the calculation the produce of the two plots on which the soil itself was inoculated (Plots XIII. and XIV.) we find that the plants from the inoculated seed bore 7375 pods, weighing 67,017 grammes, containing 26,016 grammes of peas, while those from the uninoculated seed bore 7,708 pods, weighing 68,188 grammes, containing 26,465 grammes of peas. In other words, the inoculated seed gave 5 per cent. less in number of pods and 2 per cent. less in weight of pods and seed than the uninoculated.

The average weight of the pods from the uninoculated plots was 8.8 grammes, and of the peas they contained 3.4 grammes. The average weight of the pods from the inoculated plots was 9 grammes, and of the peas they contained 3.5 grammes.

Effect of Inoculation on Time of Maturity of the Crop.—In certain of the reports quoted in "Seed and Soil Inoculation for Leguminous Crops," by Professor Bottomley, it is stated that inoculated plants matured earlier than non-inoculated. Thus one says that inoculation of peas "rendered a fortnight earlier marketing possible" (p. 16). "The sweet peas started to blossom earlier than the non-inoculated" (p. 18). "The row treated (peas) . . . certainly earlier" (p. 18). "The peas . . . inoculated were ready quite two weeks before the others" (p. 21).

It would be tedious to give the mass of figures from which the relative earliness of the peas in the Wisley trial is to be arrived at, and it will suffice to say, since this result is typical of the whole, that while five plots in which inoculated seeds of 'Telegraph' were sown yielded 86,129 grammes, the first two pickings from these plots weighed 20,464 grammes, or 56 per cent. of the whole; the produce of the corresponding uninoculated plots was 88,087 grammes, of which 20,502 grammes, or nearly 54 per cent., was included in the first two pickings, made on the same days as those from the inoculated plots. In this trial, therefore, inoculation had no influence whatever upon the earliness of the crop.

Effect of thorough Cultivation on the Crop.—Many interesting points are raised by a consideration of the results of this experiment, some of which may be touched upon in the future, but one is exceedingly striking and so important that attention is drawn to it now. It is with regard to the total crops obtained on the two halves of the experimental plot respectively. The weights of the pods are shown in lb. avoirdupois in the following Table :—

TABLE P.

Variety	Cultivated land. Wt. of pods in lb.	Fallowed land. Wt. of pods in lb.
Ne Plus Ultra	152½	106
Duke of Albany	165½	75½
Telegraph	190½	128
Maincrop	120	59
	<hr/> 628½	<hr/> 368½

As has been before pointed out, the main difference in the two halves of the ground is that on one the land had been deeply worked, on the other it had been dug but one spit deep. *The difference in yield in favour of deep digging for peas is 70 per cent.*, and the benefit derived is very marked in the case of every variety.

Probable Cause of the Failure of Inoculation to Increase the Yield. — With the “Nitro-Bacterine” culture material Professor Bottomley sent out the following note :—

“The Inoculating material is beneficial *only* for leguminous (pod-bearing) plants. Each culture is adapted for the particular legume named on package No. 2. The culture solution, when properly prepared and applied, causes the formation of nodules on the roots of the particular legume, and renders available to these plants the free nitrogen of the air.

“Inoculation will prove beneficial—

“(a) On poor soil, *i.e.* soil low in organic matter.

“(b) On soil which has not grown legumes for some time.

“(c) When the legume to be sown belongs to a species not closely related to the one previously grown.

“(d) When the legumes usually grown are deficient in root nodules.

“Inoculation is useless—

“(a) When the leguminous crop usually grown is producing up to the average, and the plants show plenty of root nodules.

“(b) When the soil is already rich in nitrogenous material. Heavily manured soil rich in nitrates appears to prevent the formation of root nodules.

“(c) When the soil is acid and needs lime, or when phosphates are deficient.

“(d) Inoculation will not overcome results due to bad seed, improper cultivation of ground, or adverse weather conditions.”

All the points touched upon in this note have been already discussed with regard to the experiment, and it has been shown that the amount of organic matter in the soil is very low; that for many years no legumes

have been grown upon the site of the experiment, and that probably peas have never before been grown there; and that leguminous crops have not as a rule produced an average crop; all of which might lead to an expectation of a favourable result following the inoculation. That such a result did not follow is probably due to the fact that the soil is already well inoculated with the nodule-producing germs, and that the germs normally present are at least as "virulent" as those in the "Nitro-Bacterine," and in view of the fact that out of the 48 rows in which inoculated seeds were sown 31 gave a crop smaller than was produced by the corresponding uninoculated rows it would seem highly probable that the normally nodule-forming bacteria of the soil possessed a higher virulence than those in the "Nitro-Bacterine."

Conclusion.—It is not claimed for this experiment that it shows what is to be expected under all conditions, or that under no conditions is inoculation of leguminous plants likely to be followed by increased yield, but the result obtained at Wisley leads to the conclusion that inoculation with "Nitro-Bacterine" of leguminous plants grown in garden soil, even when the garden soil is as poor as that of Wisley, is very unlikely to be followed by an increase in the crop.

Several Fellows of the Society who have tried the effect of inoculation with "Nitro-Bacterine" in their own gardens have kindly sent me their results, and all point to this conclusion.

I take the opportunity of cordially acknowledging the intelligent and painstaking assistance rendered by Mr. Wm. Brown and Mr. H. L. Robson, two of the senior students in the Garden, in carrying out this experiment, and the help of Mr. A. C. Smith, the Assistant-Superintendent of the Garden, in supervising the cultural operations connected with it.

SUMMARY.

1. A trial of the effect of inoculation of peas with "Nitro-Bacterine" was conducted at Wisley in 1908.

2. The soil of the Wisley Garden is one more likely to respond to such inoculation than the majority of garden soils.

3. The experimental area was divided into twenty-four equal plots, twelve being on well-worked soil, twelve on soil that had been fallowed in 1907.

4. Each pair of plots on the cultivated ground received different soil treatment, and the corresponding pairs on the fallowed land received the same treatment.

5. One of each pair of plots had seed which had been inoculated sown upon it, the other seed which had not been inoculated. One row of each of four varieties was sown upon each plot, the same varieties being used throughout.

6. It is shown that the Wisley soil is lacking in none of the chemical elements necessary for the successful growth and development of the nodule-forming bacteria.

7. Seven out of the twelve plots on which inoculated seed was sown gave smaller crops than the corresponding uninoculated plots, and one gave an equal crop.

8. There was under no soil treatment a consistent increase in the crop due to inoculation.

9. The total weight of the crop from the whole of the plots receiving inoculated seed was 450 lb., while the total from the plots in which uninoculated seed was sown was 515 lb. The uninoculated seed therefore gave a crop 14 per cent. heavier than the inoculated in the aggregate.

10. The crop from the inoculated seed was not better in any way than that from the uninoculated, nor did it reach maturity earlier.

11. There was a remarkable difference in the yield from the well-cultivated land and the fallowed land, greatly in favour of the former.

12. It is concluded that the inoculation of leguminous crops with "Nitro-Bacterine" in *ordinary garden soil* is not likely to prove beneficial.

BOOK REVIEWS.

"Wild Bees, Wasps, and Ants, and other Stinging Insects." By E. Saunders, F.R.S., F.L.S., &c. 8vo., 144 pp.; 4 plates. (Routledge, London, no date.) 8s. 6d.

Most persons are familiar with the common hive-bee, humble-bees, wasps, and the ubiquitous garden ant, but few are aware of the number of interesting insects which are nearly related to these well-known ones, and which are equally common. Hitherto there has not been any work in which a non-scientific reader could find any general information about these insects; but the book under review, which is written by one of our best authorities on this group, gives a popular and very interesting account of these wild bees, wasps, ants, &c. The author in his preface says: "These pages are written only for the non-scientific, as the scientific entomologist will be already familiar with the elementary facts recorded." The interest and pleasures of a garden are much enhanced if one has some little knowledge of its insect occupants. The butterflies and moths with their caterpillars have for years proved of more or less interest to nearly everyone, and they have a large literature of their own. Next to these, the various bees and their allies are the most prominent insects in our gardens, and the literature about them is very scanty and by no means popular. The author purposely makes only a passing allusion to the hive-bees, as so much has already been written about them, and many of their habits and ways are now matters of common knowledge. The book is well illustrated by four very good coloured plates, containing thirty-one figures and twenty-eight figures in the text. Of course in a book of this size and character it is impossible to give descriptions and figures of all the various species, some 375 in number. The book is divided into twenty-nine subjects, which really form chapters, but they are not alluded to as such nor are they numbered. On p. 2 attention is called to the very loose way in which many persons talk of insects stinging or biting, as if they were practically the same action and performed by the same part of the insect; the difference between the two processes is, however, very clearly pointed out. On p. 23 the great similarity between certain two-winged flies and some of the bees and wasps is commented on. The resemblance between the common drone-fly and the ordinary hive-bee has been already mentioned (on p. 3). There is an interesting chapter on bees' wings, followed by one on breeding these insects, in which much useful information is given which should prove of great assistance to anyone who wishes to breed them. The reason given on p. 122 for the coloured bands which ornament the bodies of so many species is not very convincing, for if the reason given be the true one, why are not all the aculeate hymenoptera banded? The last chapter but one is on the development of insects, and it should prove a very instructive one to those who wish to learn something about this very interesting subject. It tells how insects may be

known from other nearly related creatures, and how their transformations differ in various orders. The last chapter is more technical, and in it is described, with the aid of a very good figure, the external anatomy of a hymenopterous insect, the parts of the head, thorax, abdomen, and legs, the nervures of the wings, &c., all of which is most important information to those who wish to study the subject more closely. We can cordially recommend this little book to the notice of all who are interested in natural history, and who wish to increase their knowledge of the insects of which it treats, as they will find in it a fund of information which cannot but interest and instruct them.

"The Story of Insect Life." By W. R. Westell. 8vo., 339 pp., coloured plates, and 334 plain figs. (R. Culey, London, 1907.) 5s. net.

The author has succeeded in writing a very interesting book on insects in a quite popular manner, which should be useful in teaching the rudiments of entomology to those into whose hands it may fall, for it is surprising how little is known, even among well-educated persons, about the commonest insects which they meet with almost daily. How few persons, comparatively, have any idea that caterpillars and grubs are only imperfect states of some very different looking insects, and know that they do not perpetuate their species by laying eggs? Most persons are very incredulous when they are told that insects in their perfect condition never grow, and that small flies and beetles do not grow into large ones. This book is very well printed and is profusely illustrated; most of the figures are very good, but some are practically useless. The coloured plates, of which there are eight, are not numbered consecutively with the uncoloured ones; the latter are treated as if they were pages, and the figures on them as if they were in the letterpress, so that when the reader is referred to, say, plate 6, it is difficult to find, for the figures on the coloured plates are numbered differently from those on the others, and the only clue to the plate is to refer to the list of illustrations, when you learn that it faces chapter so and so; then on turning to the table of contents you find the page on which the chapter begins. It is to be hoped that this will be altered in the next edition. The figure of the wasp's nest on plate 5 is very misleading—it shows the cells as if they were formed horizontally, like those of the honey-bee; but the cells in a wasp's nest are vertical, with the opening downwards. The relative size of the figures to the insects which they represent is not given, except in a very few instances, which is a great omission, particularly in a book of this description. Some of the figures taken from microscopic slides which are semi-transparent are very unsatisfactory, as they do not give a good idea of the real aspect of the object—figs. 81, 88, 89, for instance.

On p. 89, in alluding to the provisions of Nature to prevent injury to living creatures when they fall, the author says: "The most common provision to avoid injury is that the falling body forms itself into a circle, or part of a circle, so that it does not fall plump on the centre of gravity." This sentence is very ambiguous, and one fails to understand its meaning. In mentioning the dor-beetle (p. 115), it is stated that it deposits its eggs in dung-heaps; it may do so at times, but it more

usually makes a hole, some nine or ten inches in depth, under some fresh dung, into which it thrusts a pellet of dung on which it lays an egg; when the egg hatches, the young grub finds itself surrounded with food. On p. 169 it is said that the perfect mayfly changes its skin soon after it has reached maturity. This is not really the case, as the mayfly does not appear as a perfect insect until it has cast the skin with which it is covered when it emerges from the pupal covering. There is evidently a misprint on p. 181, where a sentence reads: "the larvæ or grubs of saw-flies are sometimes called false caterpillars, because a true larva possesses not more than sixteen legs." We presume that the author intended to say "because a true caterpillar possesses not more than sixteen legs." In the account given of gall-flies no allusion is made to the very interesting fact that most of the gall-flies of the oak have to pass through two generations before the life-cycle of the insect is complete; that is, a gall-fly lays an egg in the bud of an oak, a grub is produced, which forms a gall quite unlike that from which its mother emerged, and this grub, when it eventually becomes a gall-fly, is quite different from its mother in form, exactly resembling its grandmother in appearance, while the grub hatched from its egg forms a gall of the same nature as that of the last generation but one. For instance, the gall-fly that is produced from the "common oak spangle-galls," in the spring lays her eggs in the male blossoms of the oak, and the galls which result are very unlike the spangle-galls, and are known as currant-galls on account of their resemblance to a small bunch of currants; the flies from these galls lay their eggs on the undersides of the leaves and spangle-galls are formed.

On p. 188 it is mentioned that it must not be supposed that all gall-flies produce galls, as some of the smaller ones do not, but are parasitic. This requires some explanation, as none of the gall-flies are parasitic in the way of living on some other insect; but they lay their eggs in the galls already formed by some other gall-fly; this, however, does not interfere with the maker of the gall.

Worker-bees are said on p. 211 to "have a brief but busy existence; so hard do they work, these rightly named worker-bees, that they often die of sheer exhaustion." That they have a brief existence is true; most insects in their perfect state have a very short life—some species, indeed, only live a few hours—but that they often die from sheer exhaustion is very doubtful; some probably perish when at work if they are caught in a violent shower, as they would not be able to fly through it, but would get thoroughly wet and be much knocked about, and very likely would be unable to reach their hive. Bees are said to collect propolis from flowers; this is a mistake. Propolis is a resinous substance which the insects collect from various trees. A mite which is parasitic on some beetles is spoken of and figured as the beetle-mite; this is misleading, as the true beetle-mites are not parasitic, and have received the name of beetle-mites on account of the hardness of their skins. Attention has been called to various inaccuracies which have been noticed in looking through this work, but they do not really detract from its value, for it is well calculated to serve the purpose for which it was written.

"The Butterflies of the British Isles." By R. South, F.E.S. Sm. 8vo., 204 pp. "The Moths of the British Isles." Series 1. By R. South, F.E.S. Sm. 8vo., 848 pp. (Warne, London, 1906 and 1907.) 6s. and 7s. 6d. net respectively.

Though many works have been published on our butterflies and moths, hitherto those most useful to the ordinary collector (being illustrated) have been too expensive for his purse. The present series by Mr. R. South, the well-known lepidopterist, supplies a long-felt want. The volumes he has written are of very handy size and can easily be carried in the pocket; they are well printed and profusely illustrated, most of the figures being exceedingly well coloured, and the price is most moderate; in fact it is difficult to understand how they can be sold at their price. Only two volumes are at present published; one on the butterflies and the other on the moths, beginning with the Sphingidae and ending with the Noctuidae. Other volumes are to follow. The classification of the moths is somewhat different from what entomologists have hitherto been accustomed to. Recent investigations have caused a considerable alteration in the position of certain moths. Our old friend the goat-moth is now placed near the Tortricidae instead of following close after the clear-winged moths, and is no longer known as *Cossus ligniperda*, but is called *Trypanus cossus*; the clear wings are now placed near the Tineidae; various other changes have also been made.

The volume on butterflies opens, after the preface and introduction, with Part 1, which gives the life-cycle of a butterfly, describing the egg, caterpillar, chrysalis, and perfect insect or butterfly, their external anatomy, &c.; then follow several pages on collecting which contain much useful information on nets, the various methods of setting, boxes, cabinets, &c. Part 2 contains the description of the various kinds of butterflies, their caterpillars with their food plants, and the chrysalides. The plainest and tersest language is used; there are no poetical quotations or other padding, which are quite out of place in a book of this description, but which authors, to show off their erudition, are too fond of indulging in. The plates are most excellent and in most cases give more than one figure of each species. The English name of the insect is always given before the scientific one in the heading of the description of the insect, which is a pity, as popular names should not be encouraged, though perhaps necessary evils. One great disadvantage of them is that they do not show the affinity of one species to another in any way; for instance, "the small square spot," "the six-striped rustic," and "the cousin-german" are described in the sequence here given; but the English names do not show that they have any relationship to one another, whereas the scientific names *Noctua rubi*, *N. umbrosa*, and *N. sobrina* at once denote their relationship and that they belong to the same genus. The "hedge rustic," which one might imagine was some connection of the other rustic, belongs to quite a different genus (*Tholera*). In the introduction to the volume on moths the peculiarities of their structure as differing from that of butterflies is pointed out, a figure is given showing various types of antennæ, and there is also a figure showing the veins and giving the names of various markings on the wings.

Under the heading of "field work" some useful information is given as to when and where to look for moths. Then follow the descriptions of the various families, genera, and species. The usefulness of the volume would have been much enhanced if a classified list of the moths had been given of a similar nature to that of the butterflies. We can most confidently recommend these two volumes to those who are studying or intending to study our British Lepidoptera.

"Hardy Ornamental Flowering Trees and Shrubs." By A. D. Webster. Ed. III., 8vo., 283 pp. (Messrs. Smith, Elder, London, 1908.) 8s. 6d.

In this the third edition the author has added several very useful chapters regarding recent introductions in trees and shrubs, on pruning, planting, and grouping, on ornamental foliaged trees for various soils and situations, and the family to which each belongs. We cordially agree with the author that the monotonous repetition in at least nine-tenths of our parks and gardens of such trees as the elm, the lime, the oak, and such shrubs as the cherry laurel and the privet, is neither necessary nor desirable. Amongst oaks we may make one or two exceptions and include such as *Quercus coccinea* 'Waterer's variety,' a truly magnificent variety for autumn effect, and a rapid grower; and in cherries we should include that most beautiful of all weeping trees, *Cerasus sinensis pendula rosea*, an ornament to any lawn and beautiful by a lake side. Why planters will persist in putting in such masses of poor trees and shrubs we cannot imagine when there is such a wealth of truly beautiful and perfectly hardy things to choose from, and, when judiciously selected, admirably suited to all soils and situations. Of course it would only be a waste of time, money, and labour to plant anything belonging to the order *Ericaceae* where there is lime or chalk, but excluding this order there are great numbers of trees and shrubs available. We should add one shrub to those named by the author for growing in the shade, viz. *Rubus odoratus*, and *Rosa rugosa* succeeds fairly well under deciduous trees. The lists of climbing shrubs, autumn-tinted foliage trees and shrubs, those that produce berries, and suitable ones for town planting are excellent.

"The Summer Garden of Pleasure." By Mrs. Stephen Batson, with 86 illustrations in colour by Osmund Pittman. 8vo., 231 pp. (Methuen, London, 1908.) 15s.

A beautifully written and well-printed book with excellent illustrations, but a little too expensive for the pocket of the ordinary garden lover who is usually anxious to spend his or her spare cash on things for the garden. There are eleven chapters dealing with the wild garden, early and late summer flowering plants, lilies, and the scarcity of flowers in August, &c., all full of information of a most useful character. We think the authoress's remarks on the wild garden are much needed at the present time, as so many are making wild gardens under the impression that it is the simplest and easiest, as well as one of the most delightful phases of gardening. No style of gardening is more difficult or requires more care, and the problem for the experienced man or woman is how

much to do, and how much not to do, as it is equally as easy to do too much as it is to do too little, and thus spoil the whole effect. Again, many have an idea that anywhere will do for a wild garden, but to have a really good one means a favourable soil and position, with the best possible judgment on what to plant, where and how. When it can be made a part of the garden scheme, coming quite naturally as a part of the garden, then by all means have it, but it means work and not indolence, as many seem to imagine, and so we welcome the authoress's timely advice.

"Pansies and Violets." By D. B. Crane, F.R.H.S. 8vo., 128 pp. (Collingridge, London, 1908.) 1s.

Mr. Crane is a well-known grower and exhibitor of these plants, and his little book is very welcome, as there are few books on these plants. The information is very practical and clearly given, dealing with all phases of culture, with botanical and historical notes. We can confidently commend this book to all who possess a garden.

"My Garden." By Mary Pendered. (Sisleys Ltd., London.) 1s.

This is really a notebook of handy size, with one side showing the work of the week, and the other making notes, such as recording work done, and as such useful for the gardener or amateur.

"La Mosaiculture pratique." By Albert Maunenc. Seventh edition, with 254 illustrations, including 4 coloured plates. 8vo. 448 pp. (Paris, Librairie et Imprimerie horticolas, 1908.) Paper cover, 3 f. 50.

A handbook of formal bedding admirable in its simplicity and breadth of treatment. Its excellence as a manual and the popularity of the subject in France are shown by the rapid exhaustion of the preceding six editions and the issue of the present much enlarged and largely rewritten seventh. In England carpet bedding, ribbon borders, and formal gardening generally have been for many years regarded with but little favour, partly, no doubt, owing to the remarkable influx of new hardy exotics, but also owing to our almost national preference for greater freedom in the treatment of plants, a preference voiced by Bacon when of the coloured sands and formal beds of his day he said, "You may see as good sights many times in tarts," and admitted when those beds laid out in the simplest and least ambitious style became known as "*parterres à l'anglaise*." But in association with architecture and in frequented walks in our parks and large gardens formal bedding has its rightful place and its inimitable effects, and recent years have seen a noticeable improvement in the taste evidenced in its designs and the judgment applied to its use. The present manual, after a brief historical summary of the development of modern styles and a criticism of their scope and limitations, proceeds to their adoption in the formation of beds of permanent or seasonal interest. Colour harmonies and contrasts are discussed, and every step in the making of a garden, from the preparation of the washes employed in colouring the pencil design to the pinching and watering necessary after actual planting, is fully and simply explained. Extensive lists are given of plants for special purposes, so that the plants suitable for spring, summer, autumn,

or winter bedding, plants of a particular height or colour or foliage value, are easily discovered. Methods of propagation are detailed, and the last chapter, of seventy pages, is devoted to a series of practical examples of geometric beds, with their appropriate plants. England receives but scanty notice both with regard to the history of the subject and to the many fine examples now found in our public parks, and it is with surprise that we read that blue is the predominant colour in our bedding schemes; but as a practical French manual to the subject, from the simplicity of explanation and fulness of illustration, the book is an invaluable one.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 264, 265.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.L.S., F.R.H.S.
 Cook, E. T., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Cox, H. G., F.R.H.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
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 Goldring, W., F.R.H.S.
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 Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Houston, D., F.L.S., F.R.H.S.
 Kent, A. H., A.L.S., F.R.H.S.
 Long, C. H., F.R.H.S.
 Massee, Geo., F.L.S., F.R.H.S., V.M.H.
 Mawley, Ed., F.M.S., F.R.H.S.
 Moulder, Victor J., F.R.H.S.
 Newstead, R., A.L.S., F.E.S., F.R.H.S.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.H.S.
 Reuthe, G., F.R.H.S.
 Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
 Shinn, C. H., F.R.H.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Wilson, Gurney, F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticoltura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural Collage, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.

Journals, &c.	Abbreviated title.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

.NOTES AND ABSTRACTS.

Abies nobilis, Gall-formation on. By E. Molz (*Nat. Zeit. Land-Forst.* vol. vi. pp. 151-154; 4 figs.; February 1908).—The author has traced the formation of twig and branch galls to *Chermes piceae* var. *Bouvieri*, and has cleared up some of the difficulties existing concerning the life-history of this insect. It passes some time in bud-galls, then takes up its position at the base of a needle, where it can be seen covered by a waxy covering. Beneath the insect a bark-gall about the size of a pea is formed, and where several of these fuse together the twig is swollen and malformed. The needles and upper part of the twig suffer for want of nutrition and die off, so that ultimately the whole tree is dwarfed.—*W. G. S.*

Aconitum volubile latisectum (*Rev. Hort.* April 16, 1908, p. 169).—A new species introduced from China by Vilmorin Andrieux and described as a beautiful and curious climber with dark green elegant foliage and large deep blue flowers, blooming in succession in the autumn until the frost. Very ornamental for trellis-work.—*C. T. D.*

Almonds, Parasites of (*Le Jardin*, vol. xxii. No. 509, p. 131, May 5, 1908).—M. de Loverdo has been experimenting on the action of cold upon the two parasites of almonds which have recently been so destructive in France: *Paralipsa gularis*, a native of N. India, but now unfortunately acclimatized in Provence; *Piodia interpunctella*, which is indigenous. The larvæ hatched from eggs deposited by these pests give a nauseous flavour to dishes compounded with the affected almonds. The best remedy is to store the fruit in a cold chamber, which completely arrests the development of the pest, and the almonds can then be taken out and utilized as required, care being taken not to give the parasites time to revive in a warmer atmosphere.—*F. A. W.*

Alpines, Rare and Beautiful. By B. Othmer (*Die Gartenw.* 42, p. 493, July 18, 1908).—*Androsace helvetica* resembles in habit a fine short moss, with small silky leaves on tiny stems, and delicate pink flowers, which close during rainy or foggy weather and open during sunny days. The flowers always turn to the sun. *Senecio incanus* resembles somewhat the maritime *Cineraria maritima*, but is very much smaller in foliage. It is, nevertheless, a high alpine, growing at 2000 to 3900 metres altitude of the Alps.

Helianthemum pilosum is one of the prettiest of rock roses. The rather large showy flowers are rose-coloured, and the leaves ovate-lanceolate, small and hairy.—*G. R.*

Apple Leaf-spot caused by Sphaeropsis malorum. By W. M. Scott (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 121; pp. 47-54; 2 plates,

April 1908).—A summary of investigations into the cause of a leaf-spot very generally prevalent in apple orchards east of the Rocky Mts. is given. The disease is shown to be due to the fungus *Sphaeropsis malorum* Pk., which produces circular (or irregular) reddish-brown spots, an eighth of an inch or more in diameter, on the leaves. Other fungi occur quite commonly on the leaves, but do not appear to be parasitic. This fungus is very prevalent on dead twigs or apples, &c., and on canker spots on the branches, &c. The spot is very similar to that described in R.H.S. JOURN. xxxiii. p. 500, but the spots are usually smaller than those caused by *Cladosporium*.

The trouble has yielded well to spraying with Bordeaux mixture twice, the first time just after the petals have fallen, the second about four weeks later. A third may be necessary in very wet districts.

F. J. C.

Apples, Respiration of. By F. W. Morse (*U.S.A. Exp. Stn. New Hampshire, Bull.* 185, February 1908; figs.).—Respiration occurs in apples during storage. The experiments detailed showed that at 32° F. 1 kilogramme of apples exhaled, on an average, in one hour, 5.2 milligrammes of carbonic acid gas; at 50° F., 13.2 mg.; and at 68° F., 21.8 mg. This CO₂ is produced at the expense of the substance of the apple itself; and the experiment emphasizes the need of cooling the apples to a low temperature as soon after picking them as possible.

F. J. C.

Arsenical Salts as Insecticides. By H. Grosjean (*Le Jardin*, vol. xxii. No. 510, p. 158, May 20, 1908).—Another valuable report on the use of arsenic as an insecticide. M. Grosjean considers that there is no danger in its use, because it is applied in the very early stages of plant growth. It is, however, prudent for the operator to wash himself carefully and brush his clothes after handling it, and it should be kept away from children. If applied to pastures or orchards no cattle should be allowed to feed there for some time, nor should fruit trees be treated in the vicinity of vegetables.—F. A. W.

Arsenical Treatment of Plants. By J. Vercier (*Le Jardin*, vol. xxii. No. 509, p. 142, May 5, 1908).—This article gives an interesting account of arboricultural experiments with preparations of arsenic during the last thirty years. By a curious anomaly the sale of these preparations as insecticides by French firms is not permitted in France, for fear of a deleterious action on the fruits or vegetables treated with them, but American firms are allowed to sell the same preparations in the country, avowedly for the same purpose! Lead arsenate seems to be the most efficacious, but is also the most dangerous. Schweinfurt's green is therefore recommended, in the proportion of 800 grammes to 800 of carbonate of soda and 100 litres of water.—F. A. W.

Asparagus, Tube Culture of. By J. M. Buisson (*Rev. Hort.* April 1, 1908, pp. 158–9; 8 illustrations).—Deep planting and banking up of asparagus is deprecated as injurious to vitality and contributing to delay in growth. The production of an earlier crop is obtained by means of

earthenware tubes about two to three inches in diameter and eight inches long, which are placed over the shoots on their emergence from the soil and filled with soil. The shoots being ready for cutting, having reached the top of the tube, the tube is lifted off, the soil falls out, and (judging by the illustration) the shoot is pulled away by hand. By this means about a month is gained, as the shoots grow more rapidly.—*C. T. D.*

***Azolla filiculoides* (syn. *A. magellanica*)** (*Die Gartenw.* 41, p. 483, July 11, 1908).—Introduced from California. The plants resemble miniature *Selaginellas*, but are aquatic. *A. filiculoides* is often mistaken for the more common *A. caroliniana*, but it has larger leaves, and though almost tropical, it survives the most severe continental winters. On the Dutch lakes, ponds, and ditches the plants form a thick covering—at first green, later reddish in colour—to the detriment of other weaker water-weeds. In October or November they decay, leaving the sporangia, which sink, to rise to the surface again in May the following year, and, however few may survive the winter, by July their numbers have increased by millions. They will not grow everywhere; the water must have a muddy bottom with a certain amount of humus and not too much lime. *A. caroliniana*, an older plant in Europe, increases much slower, and often disappears from places where it may have been at times plentiful.—*G. R.*

Bacteriology, Review of Investigations in Soil. By E. B. Voorhees and J. G. Lipman (*U.S.A. Dep. Agr., Off. of Exp. Stn., Bull.* 194; October 1907). The matter in this review is itself too condensed to admit of further condensation. It gives an excellent review of the work that has been accomplished during the past few years in the investigation of the part played by bacteria in rendering a soil fertile. The state of our knowledge concerning the action of bacteria in relation to nitrogen and nitrogen compounds is very exhaustively dealt with.—*F. J. C.*

***Begonia cathayana*.** By W. B. Hemsley (*Bot. Mag.* tab. 8202).—Nat. ord. *Begoniaceae*. China. Herb 2-3 feet high; leaves fleshy with soft scurfy crimson hairs; flowers $1\frac{3}{4}$ inch across; male perianth of 4 petaloid leaves; female perianth equally 5-leaved.—*G. H.*

Berlin Botanical Garden. By J. G. W. (*Gard. Chron.* No. 1117, p. 325, figs. 145 and 146; May 23, 1908; No. 1118, p. 341; and No. 1119, p. 361).—An account is given in this series of articles of the Botanic Garden now being formed at Dahlem, near Berlin. The acreage is said to be only about half that at Kew, and "to be planned on more scientific lines than those which have determined the character of the English establishment." "Something like a quarter of a million pounds (English) have been spent on its construction, and probably at least as much more will be required to complete it. The principal consideration has been the provision of a teaching garden." The departments consist of an arboretum, which is the largest and most important, covering about fifty acres; herbaceous and alpine plants; geographical grouping of plants; medicinal or economic plants; morphological or biological

collections; and the decorative department. The great feature at Dahlem is the Alpinum, a series of rockeries intended to represent the great mountain ranges of the world: their lower slopes are clothed with grass, trees, and shrubs as in nature, while higher up the vegetation becomes gradually dwarfed. The glass houses are numerous, and are divided into nursery and show departments; into the former the public are not allowed to enter without a special pass; all the houses are connected by an underground tunnel for the use of the employés. In addition to the garden there is also a large building containing the herbarium, library, and museum specimens. *G. S. S.*

Black Currant Pest. By J. Vercier (*Le Jardin*, vol. xxii. No. 511, p. 170, June 5, 1908).—The attack of the currant clearwing moth, *Sesia tipuliformis*, a deadly and increasing pest, may be recognised by the withering of the leaves and fruit on a branch in May and August. This is caused by caterpillars hatched under the bark, which tunnel their way through the heart of the wood. M. Vercier urges the burning of these diseased branches as soon as they wither; otherwise, if merely cut off and heaped together, the grubs have time to develop into moths, and the second generation will be worse than the first.—*F. A. W.*

Black Locust (*Robinia Pseudacacia*). By Gifford Pinchot (*U.S.A. Dept. Agr., Forest Service, Circ.* 64; Sept. 1907).—The Locust Tree or False Acacia is well known in this country as a valuable timber producer, though it is rarely cultivated for purely economic purposes. The timber produced in this country is of excellent quality, and the lasting properties when brought in contact with the ground have often been the subject of comment. The range of the Locust is from Pennsylvania to Georgia, and in certain portions of Eastern Indian Territory and Arkansas. The methods of propagation, planting, injurious insects, and economic uses of the wood are treated of.—*A. D. W.*

Bulbophyllum fascinator. By R.A. Rolfe (*Bot. Mag.* tab. 8199).—*Nat. ord. Orchidaceae*, tribe *Epidendreae*. Annam. Epiphyte; leaves elliptic, oblong, 2 inches long, 1 inch broad; flowers large, with long sepaline appendages; green with purple or crimson markings; lower sepals coherent.—*G. H.*

Cactus Dahlias. By S. T. Grignan (*Rev. Hort.* June 1, 1908, pp. 252–8; coloured plate).—A description of several varieties raised by MM. Cayeux and Le Clerc, the one depicted “Conservateur Lefebvre” representing a very fine type with brilliant orange and scarlet petals, with a tinge of heliotrope.—*C. T. D.*

Canker Worm, The Spring. By H. A. Gossard and J. S. Houser (*U.S.A. Exp. Stn., Ohio; Circ.* 65; March 1907; figs.).—A life history of this insect (*Paleacrita vernata*) is given, and preventive measures suggested, see p. 122. Nothing new is added, but the authors consider that the method of grease banding is more sure than spraying with arsenical compounds in dealing with the pest.—*F. J. C.*

Cassava : its Content of Hydrocyanic Acid &c. By Charles C. Moore (*U.S.A. Dep. Agr., Bull.* 106).—Cassava is known as “sweet” and “bitter” according to the percentage of hydrocyanic acid present.

It is chiefly used in the form of meal for producing a low grade of starch for gums, pastes, and sizes. It is also used in the manufacture of industrial alcohol.—*C. H. L.*

Chirita barbata. By T. A. Sprague (*Bot. Mag.* tab. 8200).—Nat. ord. *Gesneraceae*, tribe *Cyrtandreae*. India. Perennial herb 2 feet high, leaves pubescent, 3–6 inches long; corolla funnel-shaped, bluish-lilac, 1 inch long; lobes slightly spreading.—*G. H.*

Chrysanthemums in Japan. By L. K. (*Gard. Chron.* No. 1099, p. 42; January 18, 1903).—In this paper it is said that “to see chrysanthemums cultivated to the highest point of perfection it is necessary to visit the grounds of the Imperial Palace at Tokyo; there the cultivation of this plant has been carried on for many hundred years, and after passing through these chrysanthemum grounds one has seen the most noteworthy specimens in the land of the Rising Sun. November is *par excellence* the month in which to make this visit, for then the flowers have attained their highest point of development. It appears that smaller flowers are more in fashion than they are here, and that a leading feature of their cultivation is to graft several varieties on one plant. As many as forty-five varieties have been grown on one stock, the result being that the plant looks like an enormous bouquet. The plants are trained upon bamboo frames and vary in diameter from 9 to 11 feet, and carry from 4,000 to 7,000 blossoms.”—*G. S. S.*

Codling moth. By J. T. Nicholson (*U.S.A. Exp. Stn., Oklahoma, Bull.* 76; 1908).—A life history of the moth is given with some statistical data concerning the position in which the eggs are laid, the greatest number being deposited on the leaf. Trap lanterns were used for catching codling moths between the nights of September 8 and October 15, and out of 2,577 insects of different kinds caught, 1,292 were beneficial insects, whilst a large number of others were not harmful enough to be economically considered.—*C. H. H.*

Coelogyne perakensis. By R. A. Rolfe (*Bot. Mag.* tab. 8203).—Nat. ord. *Orchidaceae*, tribe *Epidendreae*. Perak. Epiphyte 1–1½ foot high; leaves 5–7 inches long; sepals light buff; petals linear, revolute, light green, lip 3-lobed, light yellow with a deep yellow blotch at the base.

G. H.

Cold Storage of Small Fruits. By S. H. Fulton (*U.S.A. Dep. Agr., Bull.* 108; illustrated).—Cold storage has been tried in the States with a view to prolonging the season of small fruits, but has not been found entirely satisfactory for this purpose, being apt to cause loss of flavour and moulding. It is, however, very valuable in enabling strawberries, raspberries, and blackberries to be kept over for a few days in case of need. For this purpose a temperature of 86° to 40° Fahr. is best, but the fruit, once removed from cold storage, should be used as soon as

possible. Small fruits can be, and are, kept in a frozen condition for weeks, and even months, for use by bakers and confectioners.—*C. H. L.*

Cranberry Spanworm, The. By F. H. Chittenden (*U.S.A. Dept. Agr., Bur. Entom., Bull.* 66, pt. ii. ; 1 fig.).—This insect belongs to the Geometridae. The moth is about 1 inch to $1\frac{1}{2}$ inch across the wings, pale leaden grey with black and brown dots and irregular lines on the wings. The larva is about $1\frac{1}{4}$ inch long, reddish brown, mottled, streaked and lined with lighter yellowish red and black. Like many of the geometers it has the habit of attaching itself to the food plant, and extending the fore part of its body quite rigidly so that it is scarcely to be distinguished from a twig. It is widely distributed in the States, and feeds upon asparagus, strawberry, blackberry, geranium, apple, pear, orange, willow, hickory, cranberry, honey locust, cotton, clover and guava. Spraying with arsenate of lead, 1 lb. to 25 to 50 gallons of water, or Paris green 1 lb. to 100 to 150 gallons of water, is recommended. The scientific name of the insect is *Cleora pampinaria* (= *Boarmia collecta*, Wlk.). A bibliography is given.—*F. J. C.*

Coloration in Plants. Anon. (*Gard. Chron.* No. 1121, p. 402; June 20, 1908).—The writer of this article says: "Few phenomena of nature are more striking than the brilliant and varied colours of the flowers and the splendour of the tints in an autumnal woodland. But although the matter has formed the subject of innumerable researches much still remains to be done before we shall be in a position to give anything like a complete explanation of the coloration in plants." There are very many classes of colours, but for the sake of convenience it is easy to group them into two classes. In one the pigment is dissolved in the cell-sap, whilst in the other class the colour is associated with small solid structures embedded in the cell. The chlorophyll corpuscles which give the green colour to leaves belong to the second class.—*G. S. S.*

Conifers. By E. Goeze (*Garten-Zeitung*, June and July 1908).—A list of conifers arranged according to their place of origin and the date of their original description. The names of their discoverers are also given.—*W. R. D.*

Conifers, Dwarf. By J. Clark (*Gard. Chron.* No. 1108, p. 179; March 21, 1908).—A considerable number of dwarf conifers are shown in this paper to be suitable for planting on rockeries or in beds. Nearly two dozen species and varieties are enumerated and described; many of these would probably prove too large for most rockeries, but much depends on the size of the rocks and their surroundings.—*G. S. S.*

Conifers, New, from Formosa. By B. Hayata (*Gard. Chron.* No. 1109, p. 194; March 28, 1908).—The author, after a short explanation of his position as regards the Formosan conifers, says: "The following are new species, which are very near the Japanese species." He then describes seven species, and adds as a note after each its full description in Latin.—*G. S. S.*

Conifers of China. By M. T. Masters (*Jour. Linn. Soc.* vol. xxxviii. p. 410).—The author writes: "In the present communication I have endeavoured to do for China what I have previously attempted in the case of Japan." Since a list compiled by Dr. Masters and published in 1902 was published "Dr. Henry and Mr. E. H. Wilson have enriched our collections with numerous examples." Mr. Wilson made two journeys in Central and Western China, and the present list enumerates the species he met with, and in it are given descriptions of those which have hitherto been undescribed. The Catalogue is now as complete as circumstances permit. "Some of the trees are closely allied to or identical with Eastern Himalayan forms, while others present similar relationships to Japanese species." The list of the genera and species is then given.

G. S. S.

Conifers: their Distribution in the Several Districts of China. By M. T. Masters (*Jour. Linn. Soc. Bot.* vol. xxxviii. No. 265, p. 198).—The recent researches in China by various travellers "provide matter for the consideration of the botanical geographer, and with a view of facilitating his task I now venture to lay before the Society some details relating to the distribution of the Coniferae and Taxaceae of the various provinces of China and in neighbouring countries." Two tables are given: Table I. shows the distribution of the genera of conifers in China and Japan; Table II. contains a list of all the species of conifers known to be natives of China, and shows their distribution in the various districts of the empire as well as in neighbouring countries. Remarks are made on all the different genera.—G. S. S.

Datura (Brugmansia) chlorantha. By R. Farry-Desloges (*Rev. Hort.* July 1, 1908, pp. 302-3; coloured plate).—A very beautiful single form of the long known double variety of this species. Large trumpet-shaped flowers of a bright yellow tint, with long pointed projections from the lips. C. T. D.

Didymocarpus cyanea. By T. A. Sprague (*Bot. Mag.* tab. 8204).—Nat. ord. *Gesneraceae*, tribe *Cyrtandreae*. Malay Peninsula. Herb stemless; leaves 3-6 inches long; corolla deep blue, 1½ inch long.—G. H.

"Die Back" of Peach Shoots. By G. Massee (*Kew Bull.* 7, 1908, p. 269 271; 1 plate).—A disease of peach shoots called "die back," due to the attack of the fungus *Naemospora crocea* Sacc, is described. The leaf buds of the affected shoots expand normally, but when the blossom is fully open the young leaves wilt, turn brown and die within a few days, the petals change to a rusty brown colour, and the flowers droop, but like the leaves remain attached to the shoot for some time. In May and June of the following year the fungus fruits are produced and the shoots are seen to be thickly studded with the minute, tendril-like, dull orange coloured masses of spores. The tendrils are rigid and horny in dry weather, soft and mucilaginous in wet, and it is thought that birds are the most frequent agents in distributing the spores. The spores do not retain their power of germination above three months.—F. J. C.

Easter Lily Bulbs, Production of, in U.S.A. By Geo. W. Oliver (*U.S.A. Dep. Agr., Bull.* 120; illustrated).—The bulbs for flowering at Easter have hitherto been largely imported from Bermuda and Japan, but are not satisfactory from these sources owing to the limited area of arable land, and consequent absence of crop rotation, which causes weakness and deterioration in the bulbs, resulting in almost certain fungoid disease, which is perpetuated in reproduction by the usual vegetative methods.

It has been found that seedlings, especially the second generation, are practically free from disease, and produce flowers even quicker than by the old method.

The pamphlet shows that bulbs can be readily and profitably raised for commercial cultivation in the States, and that disease-resisting strains can be easily maintained.—*C. H. L.*

Education, Horticultural. By C. P. Close (*U.S.A., Peninsula Hort. Soc. Trans.*, 1908, p. 94).—A lecture dealing with the means of diffusing horticultural information in Maryland, U.S.A., under the headings: Industrial and Agricultural High Schools, Farmers' Institutes, Movable Railroad-Coach Schools, Movable School of Horticulture, Fruit-growers' Organisations, Parlour Lectures to Fashionable Audiences, Country Club Horticultural Education, Popular Lectures.—*J. J. C.*

Electricity, Influence of, on Vegetation (*Rev. Hort.* June 1, 1908, pp. 248-9).—An interesting report of a lecture given by M. Magneune to the Société Nationale d'Agriculture, supplemented by data given by M. Gaston Bonnier.—*C. T. D.*

Erythroniums. By W. I. (*Gard. Chron.* No. 1110, p. 212, figs. 94 to 96; April 4, 1908).—"Dog's-tooth violets are easily cultivated and are quite hardy in this country when given the requisite conditions." Then follow some remarks as to what the conditions are, and descriptions are given of the six best species for garden cultivation. Three species are figured.—*G. S. S.*

Eucalypts. By Gifford Perichot (*U.S.A. Dept. Agr., Forest Service, Circ.* 59, October 1907).—Deals with the gum trees, particularly *Eucalyptus globulus*, and contains much useful information about its range, habit and growth, planting and the economic uses of the timber as produced in California. In America, however, the blue gum tree must be regarded as only suited for the valleys and cañons, as it cannot withstand cold cutting winds or exposed situations. The chapter on cost of planting and returns is highly interesting.—*A. D. W.*

Forcing Flowering-Shrubs, A Method of. By Professor Molisch (*Garten-Zeitung*, May 1908).—This article points out that flowering-shrubs which have been immersed in warm water for periods of from ten to sixteen hours can then by ordinary methods be brought into flower a week or ten days earlier than plants which have not been treated in this manner. The effect of the immersion is purely local, so that if half a plant only be immersed that half will be in flower when the buds on the remainder are still dormant.

Details are given as to temperature and the length of the period of immersion, for these vary with the different species of plants.—*W. R. D.*

Forest Planting in Vermont. By L. R. Jones and C. R. Pethis (*U.S.A. Exp. St., Vermont, Bull.* 182).—This concise and carefully compiled pamphlet deals in a masterly way with the best kinds of trees to plant, starting trees from seed, and laws and regulations of interest to tree planters. The illustrations showing the making and sowing of seed beds are interesting, and the work as carried out would appear to be more detailed and expensive than is usually the case in this country. The instructions, however, as to the treatment of the seedlings are excellent, while the notes under laws and regulations of interest to tree planters are to the British forester of peculiar interest.—*A. D. W.*

Forestry in Connecticut (*U.S.A. Exp. St., Connecticut, Report* 1907, pt. iv.).—This is interesting reading, and clearly shows what care the planting, tending, and reporting on young plantations receives at the hands of the American nation generally. The experiments at Windsor, and the notes on planting on watersheds are useful. The illustrations of young plantations, but particularly of our native Scots pine, leave nothing to be desired in the matter of completeness. Scots pines planted four years have attained a height of 6 feet, and are thought highly of as a timber tree in that part of the world.

The notes on the tulip tree, the catalpa, maple, and Norway spruce come kindly to planters of the same species in this country.—*A. D. W.*

Fungicides, Insecticides, and Spraying Directions. By G. E. Stone and H. T. Fernald (*U.S.A. Exp. Stn., Massachusetts, Bull.* 123, April 1908).—This bulletin gives formulas for the preparation of fungicides and insecticides for outdoor fruits, vegetables, maize, trees, and greenhouse plants, with directions for preventing and controlling fungous diseases and insects. The care of shade trees is also dealt with. Lime and sulphur wash sprayed warm in winter is strongly recommended as a fungicide on apple for scab and canker, and for shot-hole fungus and brown rot in plums, applied in spring. For surface caterpillars, to clear ground for cauliflower and cabbage, cut some clover, sprinkle it with Paris-green spray, and scatter the clover over the ground for the caterpillars to feed upon. If they appear after the cabbages are set, make a mash of 60 lb. of bran or middlings, 1 lb. of Paris-green, water to make a dough and molasses enough to sweeten. Place a little of this at the base of each plant, and keep fowls away. The caterpillars will eat the sweet poisoned mash in preference to the plants. For scab in potatoes either corrosive sublimate or formalin is recommended.

C. H. H.

Geneva, Botanical Institutions of. By H. S. Thompson (*Gard. Chron.* No. 1116, p. 909, figs. 188 and 189; May 16, 1908).—It is not generally known that in no other place in the world are there so many botanical institutions with fine herbaria and libraries as at Geneva, and that at the Conservatoire Botanique there are now collections of dried European plants which compare favourably with those at Paris, Berlin,

Vienna, or London. "The famous De Candolle Herbarium and Library are preserved by the present owner in a house in the city purchased by his great-grandfather, Auguste de Candolle, in 1785." The Candollean Library ranks with that at Kew in being one of the best and largest botanical libraries in existence. It contains more works on general botany than are found at Kew, but it is not so rich in works on pure systematic botany as either Kew or the British Museum. L'Herbier Bossier is also described. It is kept in a house at Chambesey, two miles out of Geneva. The Conservatoire Botanique and the new Botanical Gardens are also just outside the city. The Conservatoire contains the "great Delessert Herbarium and Mons. Burnat's magnificent European herbarium."—*G. S. S.*

Genista glabrescens. By J. Hutchinson (*Bot. Mag.* tab. 8201).—Nat. ord. *Leguminosae*, tribe *Genistae*. Central Europe. Shrub 3 feet high; leaves trifoliate; leaflets $\frac{1}{2}$ inch long; flowers yellow.—*G. H.*

Germination, Action of Sea-water upon. By S. Berger (*Lc Jardin*, vol. xxii. No. 509, p. 138, May 5, 1908).—In view of the dispersion of plants by sea-currents, M. Berger has experimented with salt water upon twenty-seven species of Scandinavian plants, making simultaneous control experiments with fresh water and with moist filter-paper. The effect appears to vary a good deal, since the vitality of the seeds was in some cases destroyed by the sea water; in others the percentage of seedlings was higher even than with moist filter-paper.

F. A. W.

Germination of Seed: Boiling Water as an Aid (*Rev. Hort.* June 16, 1908, p. 267).—Hard-shelled seeds of normally slow germination immersed in boiling water for ten or fifteen seconds have germinated in a week or two, and in a test case quoted here seeds of *Acacia podalyriæ-folia* so treated germinated in twelve days, while five untreated had not done so in three months; but when lifted and treated in the same way germinated in twelve days like the others. Such treatment is highly recommended for many tough-coated seeds.—*C. T. D.*

Germination, Selective Action of Ether upon (*Lc Jardin*, vol. xxii. No. 509, p. 139, May 5, 1908).—M. Vigier states that if seeds are placed in a vessel hermetically sealed, with a superposed flask containing ether enough to saturate the cavity and left for a fortnight, the effect (after airing them for three or four days before sowing, to get rid of the ether) will be to diminish germination; but, on the other hand, the surviving seeds will be markedly vigorous, as if there had been a survival of the fittest.—*F. A. W.*

Gipsy and Brown-tail Moths in New Hampshire. By E. D. Sanderson (*U.S.A. Exp. Stn., New Hampshire, Bull.* 186, February 1908; 84 figs.).—These two pests, which have been the subject of much legislation in the United States, and have been referred to at length several times in these abstracts (*Journ. R.H.S.* xxxi. p. 321; xxxiii. pp. 145-600), are dealt with at length, the life-histories and appearance

of the insects in all stages being adequately described. The larvæ of both the insects cause considerable damage to a variety of trees, often completely defoliating them, while the latter is troublesome on account of the irritation to human beings caused by the hairs from the caterpillars. Both are introductions from Europe. The text of the Act for their suppression is given; and it is stated that the best method of control of the gipsy-moth is to soak the eggs with creosote in autumn, winter, and spring; and of the brown-tail moth, to cut off and burn the webs made by the caterpillars in winter.—*F. J. C.*

Hippeastrums. By J. Douglas (*Gard. Chron.* No. 1106, p. 145; March 7, 1908).—This paper gives an interesting account of the history, cultivation, &c. of this genus, which was known for so many years as *Anaryllis*, a much more euphonious and pleasing name.—*G. S. S.*

Japanese Chestnut, the Immunity of, to the Bark Disease.

By Haven Metcalf (*U.S.A. Dep. Agr., Bur. Pl. Industry, Bull.* 121, part iv. 1908). - The contents of this pamphlet are of considerable interest, dealing as they do not only with this fast-spreading fungoid disease (*Diaporthe parasitica*), but with a Japanese form of the chestnut which, so far, has been found to be immune from the disease. *Castanea crenata* does not produce fruit of equal value to the commonly cultivated species, yet it is particularly valuable in being able to ward off the fell disease which has killed out such large numbers of the original tree in the Atlantic States.

The newly introduced tree is said to attain to a height of 50 or 60 feet in Japan.—*A. D. W.*

Julianiaceae. By W. Botting Hemsley (*Gard. Chron.* No. 1103, p. 98, fig. 42; February 15, 1908). - This proposed new family is very fully described and illustrated in a recent number of the "Philosophical Transactions of the Royal Society." "As far as is known at present the genus *Juliana* consists of four species, all Mexican: they are tortuously branched, dioecious, resinous shrubs or small trees, having alternate unequally pinnate leaves of three to eleven leaflets, and very similar to those of certain species of *Rhus*." Then follows a detailed description of the genus.—*G.S.S.*

Liparis tabularis. By R. A. Rolfe (*Bot. Mag.* tab. 8195).—*Nat. ord. Orchidaceae*, tribe *Epidendreae*. Penang. Pseudo-bulbs conical, 3-5 inches long; leaves 3-5½ inches long, nearly 2 inches broad; flowers large reddish purple, lip orbicular denticulate, ¾ inch broad.—*G. H.*

Malvastrum hypomadarum. By T. A. Sprague (*Gard. Chron.* No. 1121, p. 394, fig. 176; June 20, 1908).—This plant, though it has been cultivated in Britain for the last fifty years, has not previously been described. It is a free-flowering shrub, two or three feet high, with long slender branches which are densely pubescent; the leaves are usually 8-lobed, but show considerable variation in size, shape, and cutting. The flowers are white, with a rose-purple blotch at the base of each petal.

The peduncles bear one to three blossoms. A technical description in Latin is given of the plant, and the genus generally is reviewed.

G. S. S.

Manuring in Spring. Anon. (*Gard. Chron.* No. 1113, p. 264; April 25, 1908).—"Now that the use of artificial manures has become so common, and their action both on the plant and on the soil so well known, there is no longer any necessity for the gardener to hesitate in employing them." Their advantages are then set forth. "Of the five substances which act as manures—nitrogen compounds, phosphates, potash compounds, lime, and organic compounds—the first three benefit the plant alone, the other two also improve the texture of the soil." The action of each of these manures is then detailed, and directions for their use are given. In conclusion the writer says: "But without doubt the great advantage of artificial manures is that the gardener who has made himself acquainted with their effects can use the particular manure, or manures, necessary to obtain just those results he wants."

G. S. S.

Mint-growing for the Essential Oil. By G. H. Grollier, P.A.S.I. (*Jour. Bd. Agr.* xv. p. 318; August 1908).—The "black" mint is more generally grown than the "white," as it yields double the quantity of oil. It grows best on a deep rich loam on gravel, but will also succeed on a chalk subsoil, liking a moist spring and a dry summer. Directions are given for making the plantation, which will last only four or five years, and an account of the process of distillation. The cost of growing mint is considerable.—F. J. C.

Mistletoe. The attention of readers is drawn to a number of papers on the biology of this plant which have appeared in the *Naturwiss. Zeitschrift f. Land- u. Forstwirtschaft*, vols. v. and vi. The series give a very complete account of the genera and species included under the term 'Mistletoe,' and bring out that the common *Viscum album* is really an aggregate name for several distinct varieties limited to definite host-plants. Experiments on feeding birds with the berries have also thrown considerable light on the process of distribution and germination.

W. G. S.

Moles. By G. Liebach (*Die Gartenw.* 41, p. 485, July 11, 1908).—To prevent moles from doing damage to plants in frames, beds, &c., the writer recommends pushing pieces of glass, thorns, &c. into their runs, and considers this better than exterminating by trapping or poisoning.—G. R.

Mountain Laurel: A Poisonous Plant. By A. C. Crawford (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 121, pt. ii.; plates).—An account of investigations into the poisonous properties of the so-called American mountain laurels, *Kalmia latifolia* and *K. angustifolia*. These plants are said to be nearly always fatal to stock, though being hard and unpalatable they are avoided by animals unless other green food is scarce. The poison also acts upon man, in whom even honey made

from the flowers of the *Kalmia* is said to produce typical symptoms. The poisonous constituent is said to be identical with one discovered in the related plant *Pieris japonica*, which Plugge named 'andromedotoxin.' A list is given of other plants in which this poison is present.

M. L. H.

Nitrogenous Manures, The Supply of. By E. Heine (*Gartenflora*, April 15, 1908).—The writer points out that even the complete exhaustion of the fast-disappearing beds of nitrate in Chili will not lead to a nitrogen famine; for at least three materials, which can be produced in unlimited quantities, have already appeared in commerce.

In the first place, a method has been perfected by which the 2 per cent. or 3 per cent. of nitrogen contained in peat is obtained as a by-product, in the form of ammonia, in the process of extracting from the peat a gas, which can readily be utilised as a source of power for industrial purposes. The practically inexhaustible supplies of peat in various regions of the world may therefore be made to produce vast quantities of nitrogenous manure in the form of sulphate of ammonia.

Another source of nitrogen for horticultural purposes is calcium cyanamide. This substance readily parts with its nitrogen under the influence of the bacteria in the soil, and is produced by heating calcium carbide in the air. The nitrogen is thus obtained direct from the atmosphere, where the supply is inexhaustible. The necessary carbide can be produced economically wherever electric power is cheap, for it is obtained by fusing calcium and carbon in the electric furnace.

Lastly, Norway has taken the lead in obtaining nitrogen from the atmosphere by employing a very powerful electric arc to combine the elements of the atmosphere into an oxide of nitrogen. From this nitric acid is obtained, and the substance eventually put on the market is calcium nitrate. For this is claimed the advantage over Chili saltpetre, that, whereas the sodium of the latter is useless in the soil, the lime of the calcium nitrate is usually a very valuable addition.—W. R. D.

Oil of Tar as an Insecticide. By E. Wallis (*Jour. Dep. Agr. Vict.*, February 1908, p. 100).—The following is the formula used successfully in spraying for pumpkin-beetle: Crude oil of tar, $\frac{1}{2}$ pint; soft soap, $\frac{1}{2}$ lb.; caustic soda, 1 oz.; water, 5 gallons. Boil one pint water and in it dissolve soap and soda; add oil of tar, and agitate well. Then add the mixture to remainder of water (hot), agitate, and use. Confine attention chiefly to leaves on which beetles have swarmed and use a good garden syringe to spray mixture on plant.

The wholesale price of crude oil of tar is about 5s. per gallon. The pumpkin-beetle also attacks cherry trees; the habits of the beetle make it easy to destroy by contact, as they congregate in large numbers on a single leaf, whilst the other leaves of the plant may remain untouched, and only a few of the beetles attempt to take flight when the plant is sprayed. Crude oil of tar was found more effective in destroying this insect than either Paris green, arsenate of lead, or "Carbysol."—C. H. H.

***Olearia ramulosa* var. *communis*.** By J. Hutchinson (*Bot. Mag. tab. 8205*).—Nat. ord. *Compositae*, tribe *Asteroideae* Australia. Shrub

8-6 feet high; leaves linear-lanceolate, $\frac{1}{2}$ inch long; flower-heads $\frac{1}{2}$ inch diameter; ray florets white, disk yellow.—*G. H.*

Orchid Parasite. By F. Denis (*Gard. Chron.*, May 16, 1908, p. 818; fig. 142).—A short description with figure of the insect *Tenthecoris bicolor*, which causes the leaves of orchids to be covered with small white spots, as illustrated.—*G. W.*

Orchid Portraits.—The following orchids have been figured recently:

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| <i>Aerides vandarum</i> | <i>Journ. Hort.</i> 1908, i. p. 465. |
| <i>Angraecum hyaloides</i> | <i>Orch. Rev.</i> 1908, p. 187, fig. 20. |
| <i>Bulbophyllum fascinator</i> | <i>Bot. Mag.</i> t. 8199. |
| <i>B. mirum</i> | <i>Gard. Chron.</i> 1908, i. p. 348, fig. 156. |
| <i>B. morphologorum</i> | <i>Orchis</i> , 1908, p. 90. |
| <i>B. orthoglossum</i> | <i>Gard. Chron.</i> 1908, i. p. 406, fig. 182. |
| <i>Cattleya Lueddemanniana alba</i> | <i>Orch. Rev.</i> 1908, p. 201, fig. 26. |
| <i>C. Mendelii</i> , Holford's var. | <i>Gard. Chron.</i> 1908, i. p. 278, fig. 122. |
| <i>C. Mendelii</i> , var. His Majesty the King | <i>Gard. Mag.</i> 1908, p. 476. |
| <i>C. × Princesse Clémentine</i> | <i>Rev. Hort. Belge</i> , 1908, p. 165. |
| <i>C. Schrödera</i> , var. The Baron | <i>Journ. Hort.</i> 1908, i. p. 443. |
| <i>C. × Whitei magnifica</i> | <i>Journ. Hort.</i> 1908, ii. p. 75. |
| <i>Coelogyne perakensis</i> | <i>Bot. Mag.</i> t. 8203. |
| <i>Cynorchis compacta</i> | <i>Gard. Mag.</i> 1908, p. 572. |
| <i>Cypripedium bellatulum</i> , Exhlm's var. | <i>Journ. Hort.</i> 1908, i. p. 419. |
| <i>C. gigas</i> , Corndean Hall var. | <i>Orchis</i> , ii. t. 17. |
| <i>C. Lawrenceanum Hyeaenum</i> | <i>Journ. Hort.</i> 1908, i. p. 559. |
| <i>C. ventricosum</i> var. <i>alba</i> | <i>Gard. Chron.</i> 1908, i. p. 414, fig. 183. |
| <i>Dendrobium acuminatum</i> | <i>Orchis</i> , 1908, t. 16. |
| <i>D. aureum</i> | <i>Journ. Hort.</i> 1908, ii. p. 3. |
| <i>D. nobile</i> | <i>Journ. Hort.</i> 1908, i. p. 511. |
| <i>D. Phalaenopsis</i> | <i>Orch. Rev.</i> 1908, p. 146, fig. 21. |
| <i>D. thyrsoiflorum</i> | <i>Garden</i> , 1908, i. p. 287. |
| <i>D. × Venus grandiflorum</i> | <i>Gard. Mag.</i> 1908, p. 459. |
| <i>Epidendrum saccharatum</i> | <i>Orchis</i> , 1908, p. 114. |
| <i>Laelio-Cattleya Cappei</i> , Charlesworth's var. | <i>Journ. Hort.</i> 1908, ii. p. 51. |
| <i>L.-C. 'Docteur Delac'</i> | <i>Rev. Hort.</i> 1908, p. 228. |
| <i>L.-C. 'Elva'</i> , Westonbirt var. | <i>Gard. Chron.</i> 1908, i. p. 349, fig. 157. |
| <i>Leiochilus Spegazzinianus</i> | <i>Orchis</i> , 1908, p. 118. |
| <i>Liparis tabularis</i> | <i>Bot. Mag.</i> t. 8195. |
| <i>Masdevallia tovariensis</i> | <i>Journ. Hort.</i> 1908, ii. p. 99. |
| <i>Miltonia Roezlii</i> | <i>Orch. Rev.</i> 1908, p. 249, fig. 33. |

- M. vexillaria* *Gard. Mag.* 1908, p. 420.
M. vexillaria var. *virginale* *Gard. Chron.* 1908, p. 351, fig. 159.
M. vexillaria var. *Westonbirt* *Gard. Chron.* 1908, p. 352, fig. 160.
Odontioda × *Charlesworthii* *Gard. Chron.* 1908, p. 353, fig. 161 ;
Journ. Hort. 1908, i. p. 583 ;
Gard. Mag. 1908, p. 439.
O. × *'St. Fuscien'* *Gard. Chron.* 1908, i. p. 353,
fig. 162.
O. × *Thwaitesae* *Journ. Hort.* 1908, ii. p. 147.
Odontoglossum × *amabile* *Fow-*
lerianum *Gard. Chron.* 1908, ii. p. 4, fig. 4.
O. × *ardentissimum* var. *Madame*
Vuylsteke *Gard. Chron.* 1908, i. p. 363,
fig. 166.
O. × *Crawshayanum* *Orch. Rev.* 1908, p. 177, fig. 24.
O. crispum var. *Leonard Perfect* *Gard. Chron.* 1908, i. p. 321,
fig. 144 ; *Garden*, 1908, i. p. 288 ;
Gard. Mag. 1908, p. 391 ; *Orch.*
Rev. 1908, p. 172, fig. 23.
O. crispum var. *Queen of the*
Earth *Orch. Rev.* 1908, p. 232, figs. 28, 29.
O. × *egregium* var. *Madame Jules*
Hye de Crom *Gard. Chron.* 1908, i. p. 362,
fig. 165 ; *Orch. Rev.* 1908, p. 209,
fig. 27.
O. Halli var. *nigrum* *Orch. Rev.* 1908, p. 177, fig. 25.
O. × *illustre* var. *King of Eng-*
land *Gard. Mag.* 1908, p. 542.
O. × *Lairessei* *Gard. Chron.* 1908, i. p. 328,
fig. 147.
O. × *maculatissimum* *Gard. Chron.* 1908, i. p. 362,
fig. 164 ; *Orch. Rev.* 1908, p. 169,
fig. 22.
O. × *percultum* var. *J. R. Roberts* *Gard. Chron.* 1908, i. p. 395,
fig. 177.
O. × *Phoebe* *Gard. Chron.* 1908, i. p. 421,
fig. 188.
O. × *Queen Alexandra* var. *Craw-*
shayanum *Gard. Chron.* 1908, ii. p. 42, fig. 15 ;
Gard. Mag. 1908, p. 476.
O. × *Wiganianum* *superbum* *Gard. Mag.* 1908, p. 651.
O. × *Wilckeanum* *imperiale* *Gard. Chron.* 1908, i. p. 287,
fig. 129.
O. × *Wilckeanum* *Schröderianum* *Journ. Hort.* 1908, ii. p. 27.
Odontonia *Lairesseae* *Gard. Chron.* 1908, i. p. 329,
fig. 148.
Oncidium *Gardneri* *Journ. Hort.* 1908, i. p. 489.
Oreohis *hircina* *Country Life*, 1908, ii. p. 191.
Polystachya *Lawrenceana* *Bot. Mag.* t. 8211.
Restrepia *Cogniauxiana* *Orchis*, 1908, p. 127.

- Sophranites grandiflora* . . . *Gard. Chron.* 1908, p. 284, fig. 124.
Sopbro - Cattleya warnhamensis
 var. *J. M. Black* . . . *Journ. Hort.* 1908, ii. p. 171;
Garden, 1908, ii. p. 428.
Spathoglottis aurea . . . *Orch. Rev.* 1908, p. 241, fig. 31.
S. × aureo-Vieillardii . . . *Orch. Rev.* 1908, p. 241, fig. 30.
S. × Colmanii . . . *Orch. Rev.* 1908, p. 241, fig. 32.
Stanhopea oburnea . . . *Orchis*, 1908, pp. 111, 124.
S. insignis . . . *Orchis*, 1908, p. 111.
S. Rodigasiana . . . *Orchis*, 1908, p. 126.
S. saccata . . . *Orchis*, 1908, p. 124.
S. Wardii . . . *Orchis*, 1908, p. 111.
Stanhopeastrum ecornutum . . . *Orchis*, 1908, p. 124.
Trichopilia Hennisiana . . . *Orchis*, ii. p. 121, t. 18, fig. 18.
Vanda pumila . . . *Gard. Chron.* 1908, ii. p. 43, fig. 16.
V. Sanderiana . . . *Journ. Hort.* 1908, ii. p. 149.
Zygopetalum (Promenaea) xanthinum . . . *Journ. Hort.* 1908, ii. p. 195.
G. W.

Orchids: Their Structure, Development, and Fertilisation.

By R. A. Rolfe (*Orch. Rev. Mch.*, April, May, July 1908).—A lecture given at a meeting of the Kew Gardeners' Mutual Improvement Society, held on February 17, 1908, containing many items of importance to the advanced orchidist, and full of particulars for those interested in the wonderful and beautiful contrivances provided for the furtherance of fertilization by insects.—*G. W.*

Orchis hircina (*Country Life*, August 8, 1908, p. 191).—A good photograph of this extremely rare British orchid known as 'the Lizard.' A spike preserved in formalin was shown by Miss Clark at the Holland House show 1908, and attracted considerable attention. It was found near Dover, June 1908. Other records of its flowering are Canterbury, June 1860, and Wye Downs, Kent, May 1899.—*G. W.*

Orchis mascula. By J. J. Ward (*Strand Mag.*, August 1908, p. 215; figs. 1-7).—An interesting illustrated article on this British orchid. The author believes that the well-known spots on the leaves are an instance of protective mimicry, resembling so much the spots on a viper that cattle grazing naturally avoid eating them, and thus the species is preserved.—*G. W.*

Palms, Popular Species of. By W. (*Gard. Chron.* No. 1112, p. 241; April 18, 1898).—In this paper is given a short account of the palms which at the present time are most in favour, and some useful hints as to their cultivation.—*G. S. S.*

Pandanus Houlletii. By O. Stapf (*Bot. Mag.* tab. 8197).—Nat. ord. *Pandanaceae*. Singapore. Stem 7-8 feet high, 4 inches diameter; leaves linear, 8 feet long, 4 inches broad; male panicle 2 or more feet long; female spike solitary, cylindric in form, 1 foot long, orange, fleshy.—*G. H.*

Pelargonium, New Zonal, 'Yvan d'Angenlecq' (*Rev. Hort.* April 16, 1908, p. 170).—New variety raised by M. Bruant, Poitiers, distinguished by its richness and variety of colour, viz., an intense violet. Robust and free flowering from spring to autumn.—*C. T. D.*

Persimmons, Japanese. By F. H. Burnette (*U.S.A. Exp. Stn., Louisiana, Bull.* 99, December 1907; illustrated).—The native fruit having been grown for many years in Louisiana has prevented much interest being taken in the Japanese variety, which, however, can be grown productively in the Southern States.

In Japan *Diospyros kaki* takes the place of the apple, and is of great economic importance. Its astringent qualities when unripe are corrected by some native method, at present not fully understood in America, but when this is remedied the fruit is sure to increase in favour, being prolific, easily grown, transported, and marketed.

It requires little pruning, as its tendency with years is to overbear. It has few diseases and enemies, and is ornamental as a tree.

The persimmon has a high percentage of sugar, and an alcoholic beverage is made from the fruit in Japan.—*C. H. L.*

Philadelphus purpureo-maculatus ×. By W. B. Hemsley (*Bot. Mag.* tab. 8198).—Nat. ord. *Saxifragaceae*, tribe *Hydrangeae*. Garden origin. Shrub 8-6 feet high; very free flowering; flowers solitary; petals $\frac{1}{2}$ inch long, white with purple-red base.—*G. H.*

Poppies, Hybrid Oriental. By E. Bonvallet (*Le Jardin*, vol. xxii. No. 509, p. 186, May 5, 1908; coloured plate).—Describes the historical development of these beautiful hybrids in England and other countries, with the names of the principal varieties hitherto produced in France.

F. A. W.

Poppies, Tournefort. By H. Correvoon (*Le Jardin*, vol. xxii. No. 509, p. 187, May 5, 1908).—Another account of these hybrid poppies and their varieties, with a note that they are especially fine in the Floraire Gardens at Geneva in May or June.—*F. A. W.*

Potato Tuber, Dry Rot of the. By Dr. G. H. Pethybridge and E. H. Bowers (*Econ. Proc. Roy. Dublin Soc.* i., pt. xiv., pp. 547-558; August 1908; 1 plate).—The authors have reinvestigated this disease, and have come to the conclusion that it is due to *Fusarium Solani* alone, acting independently of any other organism, and that the fungus is a true parasite. Many of the tubers attacked fail to produce plants when used as sets, and others while in store become shrivelled to a dry hard mass. During the shrivelling the *Fusarium* pustules appear upon the attacked potato. An interesting account of numerous experimental cultures is given. It is recommended that (1) suspicious-looking tubers observed during lifting should be rejected and not stored (primary infection is usually from the soil); (2) a careful look-out should be kept for the appearance of the disease, and affected tubers should be removed from the store; (3) care should be taken to prevent wounding during the lifting and handling of the crop (infection takes place easily through

wounds); (4) wounded tubers should not be stored; (5) the storehouse should be disinfected.—*F. J. C.*

Preserving Fruit, A New Method of. (*Gartenflora*, April 15, 1908.)—Mr. Elwood Cooper, a Californian Horticultural Commissioner, is reported to have discovered a method of preserving fruit in nitrogen. The fruit is first packed in papier-mâché cases rendered impervious to air, but provided with a small opening. These cases are then placed in an iron receptacle from which the air is exhausted. The iron vessel is then filled with nitrogen and the openings in the cases closed by some mechanical means.

It is claimed that cases of fruit treated in this way remained perfectly sound and fresh for several months.—*W. R. D.*

Primulas, New. By S. Mottet, with a Note by "Hort" (*Le Jardin* vol. xxii. No. 512, p. 182, June 20, 1908; with 5 figs.).—A useful summary of the newer varieties of *Primula*, mostly taken from notices in the *Gardeners' Chronicle*. They are, however, figured all together.

F. A. W.

***Prunus tomentosa*.** By O. Stapf (*Bot. Mag.* tab. 8196).—Nat. ord. *Rosaceae*, tribe *Pruneae*. China. Shrub 4–5 feet high; bark deep chestnut brown; flowers white, $\frac{3}{8}$ inch diameter; fruit bairy, scarlet.—*G. H.*

***Puya violacea*.** By W. B. Hemsley (*Bot. Mag.* tab. 8194).—Nat. ord. *Bromeliaceae*. Chili. Shrub flowering more than once; including inflorescence about 3 feet high; leaves linear, with small marginal prickles; inflorescence 20 inches high; sepals green; petals deep violet, $2\frac{1}{2}$ inches long.—*G. H.*

***Rhododendron Mariesii*.** By J. Hutchinson (*Bot. Mag.* tab. 8206).—Nat. ord. *Ericaceae*, tribe *Rhodoreae*. Central China. Shrub 3–6 feet high; leaves $2\frac{3}{4}$ inches long, $\frac{1}{4}$ – $1\frac{1}{2}$ inch broad; flowers pale pink with purple spots on the upper segments, $1\frac{1}{2}$ inch across; anthers purple.—*G. H.*

***Rhododendron micranthum*.** By T. F. Chipp (*Bot. Mag.* tab. 8198).—Nat. ord. *Ericaceae*, tribe *Rhodoreae*. N. China and Manchuria. Shrub small, leaves oblanceolate, 1–2 inches long; racemes many-flowered; corolla rotate-campanulate, $\frac{1}{2}$ inch diameter, milky white.—*G. H.*

Rhodesia, Southern, A Contribution to the Botany of. By Miss L. S. Gibbs (*Jour. Linn. Soc. Bot.* vol. xxxviii. p. 425; pls. 17–20).—After some remarks on the climate the author gives a general sketch of the vegetation of the country and then proceeds to particularize. She describes twenty-three new species. The paper is illustrated with eight photographs showing the vegetation in various parts of the district.

G. S. S.

Rhus typhina* var. *flicina (*Die Gartenw.* 45, p. 584, August 8, 1908).—Resembles *R. typhina* var. *laciniata*, but differs in the more compact growth, and in the leaves, which reach 70 centimetres in length, and are glaucous green, with beautiful yellow and scarlet autumn tints.—*G. R.*

Ribes Viburnifolium. By P. Hariott (*Le Jardin*, vol. xxii. No. 509, p. 141, May 5, 1908).—A Californian *Ribes*, with *Viburnum*-like leaves, which are evergreen. The plant otherwise resembles the *Ribesia* section.—*F. A. W.*

Roselle: its Culture and Uses. By P. J. Webster (*U.S.A. Dep. Agr., Bull.* 307; illustrated).—Roselle (*Hibiscus sabdariffa* L.), otherwise known as Jamaica sorrel, is an annual from the tropics of the Old World and produces the roselle fibre of commerce. The most important relative is cotton, and among vegetables okra is related to it. The calyx is the part of the plant used as food, and makes a jelly resembling that of cranberries in colour and flavour. In India it is chiefly grown for fibre, but in Australia (Queensland) two large factories ship large quantities of roselle jam to Europe. The name "roselle" is probably a corruption of the French word *oseille*, sorrel.—*C. H. L.*

Spartina Townsendii. By Otto Stapf (*Gard. Chron.* No. 1099, p. 33, figs. 17–20; January 1908).—This plant is an introduction from the Argentine, and is now spreading very rapidly over mud banks on the Hampshire coast. The author says: "I was invited to investigate the matter from a scientific point of view. Having during the last few months paid a number of visits to various points on the Hampshire coast and the Isle of Wight to study the question in the field, I propose to give here a preliminary sketch of the history of this grass and the present extension of its area, adding at the same time a short technical paragraph for those who wish to make themselves familiar with the grass and the allied species which occur along with it." The author then proceeds to give a summary of his work. The paper is illustrated by two maps, one of the coast line which he visited, and the other showing the distribution of the genus *Spartina* in Western Europe and North Africa.—*G. S. S.*

Spraying of Orchards. By Morris and Nicholson (*U.S.A. Exp. Stn. Oklahoma, Bull.* 76, 1908).—The barrel-pump may be used for orchards up to 500 trees; for more than this, power sprayers are recommended. Hand-pumps give a pressure of 30 lb. to 40 lb.; with a gasoline-engine power-pump a pressure of 125 lb. was maintained. The Vermont type of nozzle, for general purposes, is preferred to that throwing a fan-shaped spray. Bordeaux formula used, 4·4 copper sulphate to 50 gallons; and for peaches and plums, copper sulphate 2 lb., fresh lime 2 lb., Paris green $\frac{1}{4}$ lb., water 50 gallons. Arsenate of lead is largely used, though it costs more than Paris green. A long paddle, made of a piece of board, is found to do the work better than agitators attached to the pumps. The result of several years' work indicates that seven sprayings will more often be found desirable than five, and it will not be safe to depend upon protecting the fruit with less than six. The cost of spraying varies from $1\frac{1}{2}$ d. to 10d. per tree; the amount of material required to spray a bearing apple tree varies from one to five gallons; three or four gallons of spraying mixture will cover a well-formed tree that has a spread of top of fifteen feet. The spraying mixture of Bordeaux and Paris green, or arsenate of lead, costs $\frac{1}{2}$ d. to $1\frac{1}{2}$ d. per gallon.—*C. H. H.*

Strawberry Culture and Pine Needles. By G. A. (*Le Jardin*, vol. xxii. No. 510, p. 157, May 20, 1908).—An effective protection against slugs consists in covering between the rows of strawberry plants with pine needles. These stick to the slugs and destroy them.—*F. A. W.*

Striped Garden Caterpillar (*Mamestra legitima* Grote). By F. H. Chittenden (*U.S.A. Dep. Agr., Bur. Entom., Bull. 66*, part ii. p. 28; 1 fig.).—This insect is a general feeder on kitchen garden plants. The caterpillar is about 2 inches long and marked with regular longitudinal stripes, and is mature about the middle or end of November. It hibernates as a black pupa, and the imago emerges about August. Paris green at the rate of 1 lb. to 100 to 150 gallons of water, or lead arsenate at the rate of 1 lb. to 15 to 25 gallons of water, are recommended as spraying compounds. The worst attack of the pest appears to have been in Columbia.—*F. J. C.*

Sweet Potatoes. By W. R. Beattie (*U.S.A. Dep. Agr., Farmers' Bull. 324*; plates).—A complete account of the best method of cultivating, harvesting, and storing the sweet potato; with a map of the United States showing the zones in which this vegetable may be successfully cultivated (a) for market and (b) for home consumption.—*M. L. H.*

Tillandsia Blokkii. By W. B. Hemsley (*Bot. Mag.* tab. 8192).—Nat. ord. *Bromeliaceae*. South America. Shrub, flowering once; leaves $2\frac{1}{2}$ – $3\frac{1}{2}$ feet long, 6 inches across; inflorescence crimson, 5 feet long; floral bracts crimson; flowers 4 inches long; sepals crimson, 2 inches long; petals yellow, 4 inches long, linear.—*G. H.*

Timber, Prolonging the Life of Mine. By John M. Nelson, jr. (*U.S.A. Dep. Agr., Forest Service, Circ. 111*, October 1907).—A highly instructive paper on the preservation of mine timber. First we have the factors which are destructive to mine timber, then a full account of experiments in peeling, creosoting by open tank and cylinder treatment, with comparisons of results. There are eight well-executed illustrations, which go far in elucidating the text. The results all go to show that it will pay well to peel, season, and treat it with a good wood preservative such as creosote.—*A. D. W.*

Tobacco in Hawaii, Cultivation of. By J. Smith and C. R. Blacow (*Hawaii Agr. Exp. Sta., Bull. 15*; plates).—A full account of the culture and curing of tobacco in Hawaii, giving diagrams to show the best method of constructing the barns, drying-sheds, &c., necessary in the preparation of the leaf for export.—*M. L. H.*

Tomatos, Cultivation of. By C. Potrat (*Le Jardin*, vol. xxii. No. 511, p. 168, June 5, 1908; with coloured plate).—A valuable article on the cultivation of tomatos in the open air, with a list of the best varieties.—*F. A. W.*

Tree-insects, A Trap for. By Baron Henry d'Anchald (*Rev. Hort.* May 1, 1908, p. 214; 2 illustrations).—A band of corrugated paper about ten inches wide, protected by an outer band of waterproof paper, is tied

tightly round the trunk in May. Insects find congenial harbourage in the corrugations, and can be destroyed early in the winter by removing the band and burning it.—*C. T. D.*

Varieties, Production and Fixing of, among Cultivated Plants. By M. Viviani-Morel (*Jour. Soc. Nat. Hort. Fr.* 4th Series, vol. iv., April 1908; p. 225).—An interesting article on hybridization and variation by a fellow-worker of the late M. Jordan, whose theories it attempts to elucidate.

M. Viviani-Morel points out that certain wild plants tend naturally to vary when reproduced from seed, the differences appearing (1) between the descendants of different plants of the same species and (2) between individuals descended from a common parent.

On the other hand variations may be the result of change of soil, climate, and cultural conditions: some are produced by hybridization (and here he draws a distinction between hybridization or crossing individuals of two species and what he calls *métissage*—that is, crossing two races of the same species), some are spontaneous varieties without apparent cause, some follow after mutilation or injury by insects, and some are obtained by grafting.

He discusses each of these causes and argues that any rational system of hybridization should take into account these differences in the origin of existing subjects, and that in any study of hybrids it would be well to distinguish between—

1. Hybrids produced by the crossing of two fixed species.
2. Hybrids produced by crossing one fixed and one variable species.
3. Hybrids produced by crossing two variable species.—*M. L. H.*

Vegetable Seeds, Germination of. By Edgar Brown (*U.S.A. Dep. Agr. Bur. Pl. Ind., Bull.* 181, pt. i.).—Results of tests demonstrating the poor quality of the seeds supplied in decorated packets by local stores in America.—*M. L. H.*

Viburnum Carlesii. Anon. (*Gard. Chron.* No. 1118, p. 345, fig. 155; May 30, 1908).—This is a Chinese species, and though in cultivation in a few gardens is still uncommon. The flowers when open are of the purest white. In addition to their beauty the flowers are fragrant. As “a plant for embellishing a wall this species should be specially useful.”—*G. S. S.*

Vitis gongylodes. By I. Gerome (*Rev. Hort.* May 1, 1908, pp. 202–3; 1 illustration).—This species is peculiarly interesting in bearing, as shown by the illustration, not merely bunches of berries normally, but also large tuberous bodies associated with the bunches, somewhat resembling poppy-heads in shape, with slight winged projections. These are sometimes absolutely spherical and as large as a tennis ball (*balle de jeu*). Unfortunately the nature of these growths, whether reproductive or otherwise, is not stated.—*C. T. D.*

Wall Gardening. By S. Arnott (*Gard. Chron.* No. 1104, p. 118; February 22, 1908).—In this paper the subject of wall gardening is fully

gone into, and much useful advice and information are given. The writer lays stress—and very properly—on the point that no wall garden should be formed in a position where the wall itself has not a distinct *raison d'être*, and the same rule should always be carried out in regard to pergolas and other structures. Directions are given for the best ways to build walls according to their position, whether as a support to banks or as screens or boundaries. Advice is also given as to the best plants to use.

G. S. S.

Weather, the Relation of, to the Setting of Fruit. By U. P. Hedrick (*U.S.A. Exp. Stn. New York, Bull.* 299, 1908).—Observations of the dates of blossoming have been made over six years, and the different varieties of each fruit are divided into early and late bloomers. The average duration of flowering from first blossoms to petals having dropped is, in the case of apples, nine days; pears, seven days; peaches, eight days; plums, seven days; cherries, seven days; grapes, ten days. It will be noticed that this time is only half to two-thirds as long as in England. The effects of temperature, frost, wind, rain, &c., are dealt with in reference to the setting of fruit. Temperatures are given at which the setting of the fruit is injured, whether in bud, in blossom, or in setting fruit. Cross-fertilization is dealt with, and varieties flowering at the same time recommended to be planted in proximity to one another to favour fertilization.—C. H. H.

Wood, Mechanical Principles in the Formation of. By K. Metzger (*Nat. Zeit. Land-Forst.* vol. vi. pp. 249–278, May 1908).—The mechanical principles involved in the building of timber-trees are here examined in detail. Special attention is given to the causes of excentric growth, a subject which has been much discussed. The paper is well illustrated, and is an important contribution.—W. G. S.

TRIAL OF GARDEN PEAS AT WISLEY.

Forty-six stocks of Peas were received for trial in 1908. The seeds were sown on the following dates: Early varieties, March 10; Second early, March 17; Midseason or late, on March 24. It is essential that peas should be sown fairly early at Wisley, otherwise, when dry or hot weather sets in, the crops would be a failure on the dry sandy soil there. The land had been well prepared by trenching and moderately heavy manuring, and all the stocks made excellent growth, were clean, and bore good crops. The hot, dry weather caused the first and second early varieties to come in nearly together, with only a few days between them. When ready the collection was examined by the Fruit and Vegetable Committee.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

FIRST EARLY VARIETIES.

*1. Advancement (Carter).—Height 15 inches; haulm strong and very dark green; pods usually in pairs, $3\frac{1}{2}$ inches long, averaging five to seven large sweet peas in a pod. Heavy crop. Seeds wrinkled. Raised from 'American Wonder' × 'Daisy.'

2. Daffodil, **A.M.** June 30, 1908 (Carter).—Height 2 feet; haulm sturdy and moderately dark in colour; pods usually in pairs, $3\frac{1}{2}$ inches long, averaging six or seven peas of excellent flavour in a pod. Heavy crop. Seeds wrinkled.

3. Dawn, **A.M.** June 30, 1908 (Carter).—Height 5 feet; haulm and pods dark green; pods in pairs, $3\frac{1}{2}$ inches long, averaging eight very large delicious peas in a pod. Very heavy crop. Seeds wrinkled. Raised from 'Lightning' × 'Duke of York.'

3A. Daisy, **F.C.C.** July 11, 1902 (Carter).—For description, see vol. xxvi. p. 227.

4. Early Morn (Carter). Height $3\frac{1}{2}$ feet; haulm strong, pale in colour; pods in pairs, 4 inches long, averaging eight very sweet peas in a pod. Good crop. Seeds wrinkled.

5. Eclipse (Carter).—Height 4 feet; haulm rather thin and pale; pods single, $2\frac{1}{2}$ inches long, well filled, and averaging seven peas in a pod. Good crop. Seeds round.

6. Eclipse × 'Early Morn' (Carter). Height 5 feet; haulm and foliage strong, pale green; pods usually in pairs, 4 inches long, averaging eight to nine peas in a pod. Good crop. Seeds round.

* All trials in the Wisley Garden are carried out under numbers only until judging is completed. The number prefixed to the name of the variety in the Report corresponds with that under which the variety was grown. Fellows visiting the Garden and noticing any plant under a number can easily ascertain its name by reference to the Report in the JOURNAL.

7. Evergreen Delicatesse, **A.M.** June 20, 1908 (Carter).—Height $8\frac{1}{2}$ feet; haulm strong, dark green; pods in pairs, curved, averaging nine large very sweet peas in a pod, fine dark green colour. Very heavy crop. Seeds wrinkled.

8. Giant Blue Express (Carter).—Height 4 feet; haulm strong and pale green; pods single, 4 inches long, well filled, averaging seven large fair-flavoured peas in a pod. Good crop. Seeds round.

9. Giant Lightning (Carter).—Height 4 feet; haulm pale green, strong; pods in pairs, $8\frac{1}{2}$ inches long, averaging eight large peas in a pod. Heavy crop. Seeds round.

10. Harvestman, **A.M.** June 30, 1908 (Carter).—Height $5\frac{1}{2}$ feet; haulm strong and very dark green; pods usually in pairs, 5 inches long, averaging eight large delicious peas in a pod, and commencing to crop close to the ground. Very heavy crop. Seeds wrinkled. Raised from 'Eclipse' \times 'Duke of Albany.'

11. International, **A.M.** June 30, 1908 (Carter).—Height $5\frac{1}{2}$ feet; haulm and pods dark green; pods in pairs, averaging nine large sweet peas in a pod; pods $5\frac{1}{2}$ inches long. Very heavy crop. Seeds wrinkled.

12. Lightning (Carter).—Height 4 feet; haulm light and thin; pods usually single, $8\frac{1}{2}$ inches long, averaging six medium-sized peas in a pod. Moderate crop. Seeds round.

13. Mayflower (Carter).—Height 18 inches; haulm pale and irregular in growth; pods in pairs, $8\frac{1}{2}$ inches long, averaging eight large peas in a pod. Good crop. Seeds wrinkled.

14. Pilot, **A.M.** July 3, 1903 (Sydenham).—Height 4 feet; haulm rather pale; pods in pairs, 4 inches long, averaging seven large excellent peas in a pod. Heavy crop. Seeds, some round, some wrinkled.

15. Pilot reselected (Carter).—Same as No. 14.

16, 17, 18. Seedlings 206, 209 (Carter).—These were unnamed, and received no recognition from the Committee.

19. The Clipper (Sydenham).—Height 5 feet; haulm pale green; pods 4 inches long, in pairs, averaging 9 large peas in a pod. Fair crop. Seeds wrinkled.

20. William Hurst (Carter).—Height 1 foot; haulm dark and very sturdy; pods single, $2\frac{1}{2}$ inches long, averaging six sweet peas in a pod. Good crop. Seeds wrinkled.

MIDSEASON VARIETIES.

21. Boston Unrivalled, **A.M.** July 14, 1896 (Bunyard).—Height, $5\frac{1}{2}$ feet; haulm strong, palish green; pods usually in pairs, 5 inches long, averaging eight peas in a pod. Heavy crop. Seeds wrinkled.

22. Buttercup (Carter).—Height 8 feet; growth irregular, and crop poor.

23. Commonwealth (Carter).—Height 8 feet; haulm and pods dark green; pods usually in pairs, 4 inches long, averaging nine large, excellent peas in a pod. Moderate crop. Seeds wrinkled.

24. Commonwealth reselected (Carter).—A more vigorous form of No. 23.

25. Danby Stratagem, **A.M.** July 5, 1901 (Carter).—Height 4 feet ; haulm and pods dark green ; pods $4\frac{1}{2}$ inches long, usually in pairs, handsome, averaging eight peas in a pod. Great crop. Seeds wrinkled.

26. Danby Stratagem reselected (Carter).—Same as No. 25.

27. Dreadnought (Carter).—Height 4 feet ; haulm and pods very dark green ; pods 5 inches long, handsome, in pairs, averaging seven peas in a pod. Very heavy crop. Seeds wrinkled. The Committee considered this a very promising variety.

28. Duke of Albany reselected (Carter).—A very good stock of this favourite variety, which received **A.M.** July 5, 1901. See vol. xxix. p. 681.

29. Exhibition (Carter).—Height 6 feet ; haulm very strong and dark ; pods 5 inches long, single, averaging nine large, very sweet peas in a pod. Heavy crop. Seeds wrinkled.

30. J. C. Macqueen (Yule).—Height $5\frac{1}{2}$ feet ; haulm strong, pale green ; pods 4 inches long, in pairs, averaging seven large peas in a pod. Good crop. Seeds wrinkled. A rather late midseason variety.

31. Little Wonder (Carter).—Height 3 feet ; haulm strong and dark ; pods $3\frac{1}{2}$ inches long, in pairs, averaging eight peas in a pod. Heavy crop. Seeds wrinkled.

32. Model Telephone (Carter).—A very good stock of 'Telephone,' which received a **F.C.C.** June 27, 1878. For description see vol. xxix. p. 686.

33. Quite Content, **F.C.C.** August 14, 1906 (Carter).—Height 6 feet ; haulm and pods deep green ; pods 7 inches long, handsome, in pairs, averaging ten peas in a pod. Very heavy crop. Seeds wrinkled.

34. Reliable (Harrison).—Height 4 feet ; haulm and pods dark green ; very strong ; pods 5 inches long, in pairs, averaging nine large delicious peas in a pod. Heavy crop. Seeds wrinkled.

35. Richards' Conquest (Richards).—Height $6\frac{1}{2}$ feet ; haulm pale green ; pods $4\frac{1}{2}$ inches long, single, averaging six peas in a pod. Light crop. Seeds wrinkled. Requires further selection.

36. Richards' Reward (Richards).—Very similar to No. 35.

37. Snowdrop, **A.M.** June 30, 1908 (Carter).—Height 5 feet ; very strong dark haulm ; pods 4 inches long, single, averaging seven large delicious peas in a pod. Very heavy crop. Seeds wrinkled.

38. Seedling 242 (Carter).—No award made.

39, 40. Stratagem, and Stratagem reselected (Carter).—Same as No. 25.

LATE VARIETIES.

41. Essex Wonder, **A.M.** July 4, 1905 (Hobday).—Height 6 feet ; haulm pale green ; pods 4 inches long, single, averaging nine peas in a pod. Good crop. Seeds wrinkled.

42, 43, 44, 45. Seedlings 223, 225, 231, and 241 (Carter).—No award made.

DAHLIAS AT WISLEY, 1908.

AMONG the first of the floral trials instituted at Wisley was that of Cactus Dahlias for garden decoration. In these trials a floriferous character and showy habit have been regarded as of first importance, and while the form and quality of the flowers have not been lost sight of, these, desirable as they are in themselves, have not been allowed to carry great weight when combined with a poor habit and shy flowering. It has been specially desired to secure varieties holding their flowers well above the foliage instead of buried in it, as with so many of the exhibition varieties, and on strong long stalks bearing the flowers erect, instead of on short stalks with pendent flowers, as in the more showy of the older varieties. (Figs. 39, 40.)

A considerable stock of plants was transferred from Chiswick in 1904, and new varieties have been added each year, so that altogether 380 distinct varieties have been under the observation of the Committee.

The following are lists of the varieties that have been selected each year as the best in their respective colours. In 1907 and 1908 the Floral Committee acted in conjunction with a committee of the National Dahlia Society, and the selection of varieties has been more severe :

1905.

Amos Perry.	J. H. Jackson.	Mrs. McKergow.
Arab.	King of Siam.	Orion.
Aunt Chloë.	Mary Service.	Peace.
D. A. Dunbar.	Mavis.	Reliable.
Dainty.	Mrs. John Barker.	Spotless Queen.
F. A. Wellesley.	Mrs. John Goddard.	Standard Bearer.
Floradora.	Mrs. J. S. Brunton.	Waterloo.

1906.

A. D. Stoop.	Pink Pearl.	Reggie.
Crépuscule.	Prince of Yellows.	West Hall Scarlet.
Mont Blanc.		

1907.

Beacon.	Lustre.	Molly.
Eclair.	Meteor.	Primrose.

1908.

Avoca.	Flash.	Miss Willmott.
Brightness.	May Carpenter.	Stalwart.

These may be roughly grouped under the following colours :—

White.—Mont Blanc, Peace, Spotless Queen.

Yellow.—Miss Willmott, Mrs. J. S. Brunton, Molly, Primrose, Prince of Yellows.

Buff and salmon.—Crépuscule, Mavis, Mrs. John Barker, Mrs. McKergow, Reliable.

Pink.—Dainty, Mary Service, May Carpenter, Pink Pearl.

Scarlet.—Amos Perry, D. A. Dunbar, Eclair, F. A. Wellesley, Flash, Meteor, Standard Bearer, West Hall Scarlet.

Red.—Avoca, Brightness, Lustre, Mrs. John Goddard, Stalwart, Waterloo.

Crimson.—A. D. Stoop, Floradora, Reggie.

Dark crimson.—Arab, Aunt Chloë, Beacon, J. H. Jackson.

Mauve.—Orion.

Purple.—King of Siam.

In 1908 ninety-one fresh stocks were received for trial, of which forty-seven were new varieties. Planted on June 2, they made favourable growth during the summer, although their advance was checked by the dry spells at the end of June and July. Considerable damage was done by the gales of August 31 and September 8-9. The first touch of frost was experienced on September 18, and the season's growth was finally cut down on October 22, when a minimum temperature of 26·9° F. was registered.

A.M. = Award of Merit.

XXX = Highly Commended for Garden Decoration.

DECORATIVE VARIETY.

Emily Habgood (Brousson), **XXX** 1908.—White, yellowish centre; free-flowering, the stout erect stalks displaying the flowers well. 4½ feet.

CACTUS VARIETIES.

1.* A. D. Stoop (Baxter), **XXX** 1906.—Light crimson; free-flowering, the rigid stalks holding the flowers well above the foliage. 4½ feet.

2. Adonis (Mortimer).—Crimson-scarlet, with narrow quill-petals a little twisted; very free-flowering and showy, but stalks weak and flowers pendent; habit branching and spreading. 3½ feet.

3. Alexander (Dobbie), **A.M.** September 20, 1904.—Crimson, flowers large, of good form, with straight quills; stalks stout but not well above foliage. 4 feet.

4. Alfred Kent (Kent).—Magenta-crimson, flowers large, rather rough, broad petaled. 4½ feet.

5. Alight (Dobbie), **A.M.** September 26, 1905.—Salmon-scarlet, flowers large, of good form, with thin, slightly twisted quills; habit open and spreading; showy and free-flowering, but the thin purple stalks fail to hold the flowers erect. 4 feet.

6. Antelope (Dobbie), **A.M.** September 20, 1898.—Pale fawn, buff-yellow centre; flowers too much buried. 4½ feet.

7. Arcadia (Cheal).—Lemon yellow, paler at the floret-tips; flowers small, neat, pretty, with straight quills; stalks short and weak. 4½ feet.

8. Avoca (Cheal), **XXX** 1908.—Carmine-red, flowers large with twisted quills, held boldly above the scanty foliage, on stout dark purple stalks; very showy. 5 feet. (Fig. 89.)

* See footnote, p. 288.

9. Brightness (Carpenter), **XXX** 1908.—Carmine-red, flowers small, quills straight, stalks not long; habit bushy, very free-flowering. 3 feet.

10. Bute (Dobbie).—Salmon-orange; flowers drooping on weak stalks, not showy. 3 feet.

11. Caradoc (Dobbie).—Lemon-yellow, flowers rather broad-petaled and not of much substance, but held boldly erect on stout stalks. 5 feet.

12. Cockatoo (Dobbie), **A.M.** September 20, 1904.—Lemon-yellow centre, the florets white-tipped; outer florets white, or white shaded with buff-pink and white-tipped; variable; not free-flowering, stalks short and weak. $3\frac{1}{2}$ feet.



FIG. 39.—DAHLIA 'AVOCA.'

13. Crépuscule (Dobbie), **XXX** 1906.—Pale salmon-buff, yellowish at the centre; flowers large, pendent from short stalks. $4\frac{1}{2}$ feet.

14. Cynthia (Ware), **A.M.** September 17, 1907.—Salmon-buff, yellow centre; form poor; habit bushy, free-flowering. $3\frac{1}{2}$ feet.

15. Daisy Staples (Dobbie), **A.M.** September 25, 1906.—Mauve-rose; flowers flat with narrow, almost straight, quill petals; habit erect, but flowers buried in foliage. $4\frac{1}{2}$ feet.

16. Diavolo (Baxter).—Ground colour cream shaded with pink, yellowish at the centre, the whole heavily striped and dotted with crimson; flowers above foliage but not free. 4 feet.

17. Dreadnought (Dobbie).—Crimson ; flowers immense, with broad straight quills ; stalks stout ; habit very bushy, and flowers not displayed well. $4\frac{1}{2}$ feet.

18. Ella Kraemar (Dobbie), **A.M.** September 20, 1904. Pale mauve-pink ; flowers flat, mostly semi-double, buried in foliage. $4\frac{1}{2}$ feet.

19. Elsie Turner (Mortimer), **A.M.** September 29, 1908.—Pale salmon-buff ; habit bushy ; flowers few, not displayed well. $8\frac{1}{2}$ feet.

20. Emmie Beyfus (Cheal).—Reddish- to salmon-orange ; form poor, flowers weak-centred, held above the foliage on weak stalks. $4\frac{1}{2}$ feet.

21. Encore (Ware).—Yellow, a little edged and shaded with buff ; flowers large, pendent, quills broad ; foliage and stalks dark. 4 feet.

22. Faunus (Dobbie), **A.M.** September 26, 1905.—Pale salmon, yellow at the centre ; flowers very large, but not well disposed above the foliage. $4\frac{1}{2}$ feet.

23. Flag of Truce (Dobbie).—Fine white, of good form, with the outer quills a little twisted ; habit erect, bushy, not free flowering, and flowers buried. 4 feet.

24. Flash (West), **XXX** 1908.—Bright scarlet ; flowers rather thin, with twisted quills, held boldly above the foliage ; showy. 5 feet.

25. Florence M. Stredwick (Dobbie), **A.M.** September 15, 1908.—White, cream centred ; quills broad, straight ; habit erect, showy, with flowers well above the foliage. 4 feet.

26. Frank Kent (Kent).—Scarlet, semi-double, of bad form ; habit erect, stalks stiff and flowers held well. $4\frac{1}{2}$ feet.

27. Gazelle (Dobbie), **A.M.** September 11, 1906.—Bright mauve-rose, cream centred ; quills incurved, twisted ; not free flowering, and flowers buried in foliage. 4 feet.

28. Golden Dawn (Mortimer).—Lemon-yellow ; flowers with broad, straight quills, almost buried in vigorous foliage. 4 feet.

29. Golden Gem (Cheal).—Yellow, shaded a little towards the margin with buff ; quills narrow ; stalks dark ; habit open, but not showy. 4 feet.

30. Good Hope (Dobbie).—Crimson, tipped variably with white ; habit bushy, flowers buried. 4 feet.

31. Grenadier (Mortimer).—Scarlet shaded with carmine ; stalks long but not very stout ; habit stiffly erect. 5 feet.

32. Hamlet (Dobbie), **A.M.** September 11, 1906.—Dark scarlet ; habit bushy, flowers buried in foliage. 4 feet.

33. Harbour Light (Dobbie), **A.M.** September 20, 1904.—Scarlet-orange, variable ; flowers very large, rough, and much buried in foliage. $4\frac{1}{2}$ feet.

34. Hélène (Cheal).—Mauve, cream centred ; flowers large, flat, straight-quilled ; stalks stout, dark ; habit bushy, very broad-topped ; showy. $8\frac{1}{2}$ feet.

35. Hilda Shoebridge (Cheal).—Salmon-scarlet ; broad straight quills ; stalks dark ; foliage very scanty, well overtopped by the pendent flowers ; free and showy. 4 feet.

36. H. Shoesmith (Dobbie), **A.M.** September 12, 1905.—Glowing crimson-scarlet, with very thin twisted quills ; habit bushy and flowers hidden. 4 feet.

37. Hyacinth (Dobbie), **A.M.** September 25, 1906.—Salmon-pink, yellowish towards the centre; of exhibition form, but buried in foliage. $5\frac{1}{2}$ feet.

38. Iris (Dobbie).—Mauve, cream centred; flowers of good form, but pendent on weak stalks, held just above the foliage; habit spreading. $3\frac{1}{2}$ feet.

39. Ivanhoe (Dobbie), **A.M.** September 26, 1905.—Salmon-buff, yellow centred; flowers large, quills straight, drooping from short stalks; showy. 4 feet.

40. Ivy Shoebridge (Cheal).—Centre yellow, outer petals shaded mauve but tipped with yellow; quills straight, broad; weak, dark stalks and pendent flowers. 5 feet.

41. J. B. Riding (Dobbie), **A.M.** September 6, 1904.—Salmon-buff with clear yellow centre; quills broad and straight; habit erect; not free flowering. 5 feet.

42. J. C. Newbury (Seale).—Rich crimson; flowers very large, with broad quills, held well above the foliage on dark, stout stalks; showy. $3\frac{1}{2}$ feet.

43. J. H. Jackson (Baxter), **XXX** 1905.—Deep crimson with broad straight quills; flowers large, well displayed. 4 feet.

44. Kiku San (Cheal).—Light crimson, shading at the narrow quill-tips to purple; free-flowering, but the flowers buried in foliage. $4\frac{1}{2}$ feet.

45. Lady Fair (Dobbie).—Pale lemon-yellow, the outer rays suffused with pale pink; flowers very large but pendent and buried; the florets are much doubled, and their lacerate tips give an endive-like appearance to the flower. $3\frac{1}{2}$ feet.

46. Lord of the Manor (Dobbie), **A.M.** September 20, 1904.—Glowing orange-scarlet with yellow spot at the floret-bases; flowers not very full, pendent on thin stalks; 4 feet.

47. Lusitania (Dobbie).—Light scarlet with almost straight quills; flowers with not much substance, and pendent on weak stalks, but showily displayed well above the scanty foliage. $4\frac{1}{2}$ feet.

48. Lustre (Baxter), **XXX** 1907.—Light crimson; flowers large, finely disposed on dark stout stalks. 4 feet.

49. Mauve Queen (Cheal), **A.M.** September 3, 1907.—Soft mauve; flowers weak centred and pendent, but habit free-flowering, showy, and open, with the flowers held loosely, well above the foliage. 5 feet.

50. May Carpenter (Carpenter), **XXX** 1908.—Bright mauve pink; quills broad, and flowers with not much substance, but habit bushy-erect, the stalks very rigid, holding the flowers above the foliage; showy. 4 feet. (Fig. 40.)

51. Meteor (Dobbie), **A.M.** September 25, 1906.—Destroyed by gale.

52. Miss D. Oliver (Dobbie).—Cream-white with pale lemon centre; quills straight, broad; flowers rather small, freely and lightly disposed well above the scanty foliage. 5 feet.

53. Miss Willmott (Baker), **XXX** 1908.—Yellow, shading to salmon-buff; quills straight, broad; flowers of poor form and pendent, but habit free-flowering with the flowers held well above the foliage. $5\frac{1}{2}$ feet.

54. Mrs. C. D. Radd (Cheal).—Yellow, lightly shaded salmon ; quills broad, straight ; flowers buried in foliage. 4 feet.

55. Mrs. Chas. Scott (Seale).—Rich yellow, lightly shaded salmon ; flowers thin, but foliage very scanty, and the flowers well displayed above it on dark stalks. $4\frac{1}{2}$ feet.

56. Mrs. F. Grinsted (Dobbie).—Carmine-crimson, magenta at the floret tips ; flowers large, on long stout stalks, but pendent, and not free-flowering. 4 feet.

57. Mrs. F. G. Treseder (Treseder).—Salmon-rose ; flowers large, thin, with slightly twisted quills, pendent on long stalks ; habit thin, not free-flowering. 4 feet.



FIG. 40.—DAHLIA 'MAY CARPENTER.'

58. Mrs. F. H. Cook (Cheal), **A.M.** September 12, 1905.—Salmon-orange with broad open quills ; habit bushy-erect, dark stemmed, not free-flowering. 4 feet.

59. Mrs. Geo. Stevenson (Dobbie), **A.M.** September 26, 1905.—Clear yellow, with broad quills ; stalks stout, erect ; habit strict erect. $5\frac{1}{2}$ feet.

60. Mrs. L. Twentyman (Baker).—Salmon-buff ; very dark stems and flower stalks ; not very free. $5\frac{1}{2}$ feet.

61. Mrs. Macmillan (Dobbie), **A.M.** September 12, 1905.—Pinkish-mauve with cream-white centre ; quills broad, a little twisted ; not free-flowering. 4 feet.

62. Mrs. T. G. Baker (Baker).—Orange-scarlet; flowers not well displayed. 4 feet.

63. Mrs. W. Treseder (Treseder), **A.M.** September 10, 1902.—Reddish-violet flowers pendent on weak stalks. $4\frac{1}{2}$ feet.

64. Molly (Baxter), **XXX** 1907.—Yellow, a little buff on the outer petals; quills broad, straight, flat; habit bushy and free-flowering. 4 feet.

65. Mont Blanc (Dobbie), **XXX** 1906.—White, quills twisted; flowers mostly semi-double. $4\frac{1}{2}$ feet.

66. Mozart (Seale).—Crimson, quills straight, cleft at the tip; habit bushy; flowers well displayed above the foliage on stout stalks. 4 feet.

67. Nelson (Dobbie), **A.M.** August 29, 1905.—Bright crimson, florets tipped with carmine-purple; flowers large, of good form, with twisted, incurving quills, but poorly displayed on weak stalks. 5 feet.

68. Peter Treseder (Treseder).—Maroon; quills broad and straight; flowers pendent, ill-displayed. 4 feet.

69. Pink Perfection (Dobbie), **A.M.** August 29, 1905.—Mauve-pink, flowers mostly semi-double, good stems; showy. 3 feet.

70. Primrose (Dobbie), **A.M.** September 12, 1905; **XXX** 1907.—Pale primrose-yellow, paler towards the quill-tips; stalks stout. $4\frac{1}{2}$ feet.

71. Red Cap (Mortimer).—Orange-scarlet with twisted, incurved quills, but of bad form, with open centre; stalks weak. 4 feet.

72. Rev. A. Hall (Dobbie), **A.M.** September 11, 1906.—Carmine-crimson, with twisted quills, but weak-centred; flowers buried in foliage. 5 feet.

73. Rob Roy (Cheal).—Bright crimson-scarlet, with nearly straight quills; stalks strong and wiry, but not carrying the flowers well above the foliage. 4 feet.

74. Ruby Grinsted (Dobbie), **A.M.** September 25, 1906.—Pale salmon-pink, central florets lemon-yellow; quills thin, twisted; flowers buried. $4\frac{1}{2}$ feet.

75. St. Margaret (Cheal).—Light crimson; flowers of little substance buried in the foliage. $4\frac{1}{2}$ feet.

76. Scotia (Dobbie).—Mauve-pink with cream centre and floret-tips; stalks stout, but flowers pendent. $4\frac{1}{2}$ feet.

77. S. G. Baker (Baxter).—Lemon yellow; flowers very large, with broad incurving quills, held on stout stalks. 4 feet.

78. Signal (Ware).—Dark scarlet; flowers of great substance, with broad incurving quills, but weak-centred; habit excellent, the flowers held erect on long stout stalks well above the foliage. $2\frac{1}{2}$ –8 feet.

79. Stalwart (Mortimer), **XXX** 1908.—Dark scarlet, with broad, slightly twisted quills; free-flowering and showy. 4 feet.

80. Star (Dobbie).—Salmon-buff, yellow at the centre and floret-tips; stalks stout. $4\frac{1}{2}$ feet.

81. Sunshine (Dobbie), **A.M.** September 25, 1906.—Bright mauve, paler at the quill tips; flowers not held well above foliage. $4\frac{1}{2}$ feet.

82. T. A. Havemeyer (Dobbie), **A.M.** August 15, 1905.—Bronze-salmon, yellow at the centre; habit erect, but not free-flowering, and flowers not well held. 4 feet.

83. The Bride (Cheal), **A.M.** September 3, 1907.—White; flowers small, with broad, straight quills, held above the foliage on short weak stalks; free flowering. 4 feet.

84. The Pilot (Dobbie), **A.M.** September 12, 1905.—Salmon-buff; flowers buried. 4 feet.

85. T. Parkin (Dobbie).—Light orange; destroyed by gale.

86. Vera (Baxter).—Light carmine-crimson, magenta tipped; quills twisted, cleft at the tips; flowers not well disposed. $4\frac{1}{2}$ feet.

87. Victorian (Dobbie), **A.M.** September 26, 1905.—Creamy-pink, spotted and streaked with crimson; destroyed by gale.

88. West Hall Scarlet (Baxter), **XXX** 1906.—Scarlet, quills straight; flowers well held, on stout stalks, above the foliage. 3 feet.

89. W. E. Dickson (Dobbie).—Light crimson; habit erect, but flowers buried. $5\frac{1}{2}$ feet.

90. W. Hopkins (Dobbie), **A.M.** September 6, 1904.—Magenta-crimson, straight-quilled; flowers pendent, buried in foliage. 4 feet.

91. W. Marshall (Cheal, Dobbie), **A.M.** August 15, 1905.—Yellow, lightly shaded with buff; flowers large, of good form, with nearly straight quills on long stalks; but neither free-flowering nor showy. 6 feet

CANNAS OUT OF DOORS AT WISLEY, 1908.

THE collection of Cannas grown under glass in 1906 and 1907, comprising over 200 varieties, was in 1908 planted out of doors to test the value of the different varieties as bedding-out subjects. The plants were started in gentle heat in March and planted in the open during the first week of June. The soil at Wisley, a light sandy loam, is one admirably suited to the Canna, provided that ample supplies of water and manure can be furnished to enable the plants to reach their full development. The situation chosen should be a fairly sheltered one in order to prevent damage to flower and foliage by high winds, but nothing is to be feared from heat or sunshine if the supply of water is sufficient. The frequent use of the hoe or a good mulch of well-rotted manure will be well repaid.

The plants continue to throw up flower-spikes until cut by frost, and if, before the first severe frost is experienced, they be lifted with a medium-sized ball of earth and placed under glass, either in a pot, on a bench, or in a bed, they will continue to furnish flowers until, or even later than, Christmas.

The trial-ground was inspected by a Sub-Committee of the Floral Committee in August, when the following varieties were highly commended for the freedom with which they were flowering outdoors :—

DARK FOLIAGE.

Dr. Marcus.—Orange red.

Wm. Saunders.—Deep red.

LIGHT FOLIAGE.

Elizabeth Hoss.—Yellow, richly spotted with red.

Fürst Wied.—Fiery red.

L. E. Bally.—Pale yellow, spotted with dull red.

Météore.—Rich orange.

These varieties all belong to the *Gladiolus*-flowered section, characterized by their compact growth, large trusses of flower, and smoothness and substance of petal. With the exception of Dr. Marcus and Météore they had already received Awards of Merit for the beauty of their flowers. For richness of colour and character of foliage, however, this section is surpassed by the newer orchid-flowered Cannas; and as in this section out of doors the flowers are of only secondary value, there is little to choose between the merits of the different varieties.

The trial ground was at its brightest in October, and to the varieties already mentioned the following may be added for their vigour and the freedom with which they were then flowering. All have already received Awards of Merit or have been highly commended as grown under glass :—

DARK FOLIAGE.

Grossherzog Ernst Ludwig.—Orange red.
Mrs. G. A. Strohlein.—Carmine crimson.
Stadtrath Heidenreich.—Orange scarlet.

LIGHT FOLIAGE.

Edouard Meig.—Orange scarlet.
Frau Philipp Siesmayer.—Salmon-rose.
Isabella Breitschwerdt.—Salmon-rose.
Jean Tissot.—Orange scarlet.
Karl Kirsten.—Orange scarlet.
Reichskanzler Fürst Hohenlohe.—Yellow, spotted with red.
R. Wallace.—Pale yellow, faintly spotted with rose.

A detailed description of the varieties is furnished in *THE JOURNAL*, vol. xxxiii. (1908) pp. 212 *et seq.* A rough classification is appended :—

GLADIOLUS-FLOWERED.—Compact habit; truss large, close-flowered; petals smooth, firm in texture, colours generally brilliant.

FOLIAGE DARK (*i.e.* green, variably veined and suffused with bronze and crimson).

Flowers salmon, pink, rose.

Eastern Beauty.
Evolution.
Floreal.
Frau Gräfin Ernestine von
Thun.
Hiawatha.

Juanita.
Kronprinzessin Cäcilie.
Melrose, **A.M.** 1907.
Shenandoah.
William Watson.

Flowers orange, orange-red.

Arthur William Paul.
Chappaqua.
Dr. Marcus, **XXX** 1908.
Duke Ernst.
Grossherzog Ernst Ludwig,
A.M. 1901.
Max Kolb.

Oscar Dannecker, **A.M.** 1901.
Président Carnot.
Président de Péronne.
Semaphore.
S. T. Wright, **A.M.** 1907.
Wilhelm Tell.
Wyoming, **XXX** 1907.

Flowers orange-scarlet, scarlet.

Brandywine.
Conseiller Heidenreich.
Deutscher Kronprinz.
Hans Werdmüller.
Leo Vaughan.

President Meyer.
Schwabenland.
Stadtrath Heidenreich, **A.M.**
1897.

Flowers carmine-red, red, deep-red.

Egandale.	Mt. Etna.
Hofgarten-Director Walter.	Paul Lorenz.
Mrs. G. A. Strohleim, A.M.	Professor Fr. Röber.
1901.	William Saunders, A.M. 1907.

FOLIAGE GREEN.

Flowers white.

Blanche Wintzer, A.M. 1907.	Mont Blanc.
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Flowers salmon-pink, rose.

Ami Jules Chrétien, A.M.	Isabella Breitschwerdt, A.M.
1896.	1907.
Annie Laurie.	Louise.
Camille Bernardin.	Luray.
Chas. Molin.	Mlle. Berat.
Duke of York, A.M. 1907.	Maiden's Blush.
Else.	Ottawa.
Franz Buchner.	Rosemawr.
Frau Philipp Siesmayer, XXX	Secrétaire Chabanne, A.M. 1900.
1907.	Semur A. Sannier.
H. Guichard.	Venus, A.M. 1907.

Flowers scarlet, orange-scarlet.

Alphonse Bouvier, A.M. 1892.	Karl Kirsten, XXX 1907.
Edouard Meig, A.M. 1897.	M. Florent Penwels.
Emma Bedau.	Papa.
Fräulein Anna Benary.	Philadelphia Improved.
Fürst Bismarck.	Pillar of Fire.
Goliath.	Professor G. Baker.
J. D. Eisele.	Roi des Rouges, A.M. 1896.
Jean Tissot, A.M. 1901.	Wilhelm Bofinger, A.M. 1907.

Flowers red, orange-red, carmine-red.

Auguste Chantin.	Paul Bruant.
Cyclope.	Prince Hohenlohe.
Dr. Dock.	Robert Christie.
Fürst Wied, A.M. 1907.	Triumph.
Minerva.	William Bull.

Flowers dark red.

Black Prince.	Duke of Marlborough.
Black Warrior.	George Washington Improved.
Cherokee.	

Flowers orange.

California.	Klondyke.
Francis Wood.	Météore, XXX 1908.
Hesperide, A.M. 1907.	Orange Queen.

Flowers yellow.

Aurea.	Buttercup.
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Flowers yellow, faintly spotted, or a little marked with red.

Alsace.	Mme. Chabanne.
Dr. Nansen.	R. Wallace, A.M. 1907.
John Tulett.	Sophie Buchner, A.M. 1898.

Flowers yellow, much spotted or marked with red.

Antoine Barton, XXX 1894.	J. B. van der Schoot, A.M. 1907.
Betsy Ross.	Konsul W. Vellnagel.
Chameleon.	L. E. Bally, A.M. 1894.
Comte de Bouchard, A.M. 1897.	Mme. Legris.
Duchess of York, A.M. 1898.	Miss B. Brunner.
Elizabeth Hoss, A.M. 1901.	Reichskanzler Fürst Hohenlohe,
Florence Vaughan.	A.M. 1901.
Gladiator. A.M. 1907.	Striped Beauty.

Flowers scarlet, edged with yellow.

Admiral Schley.	Mme. Crozy, A.M. 1890.
Alliance.	Martha Washington.
Conqueror.	Paul Sigrist.
General Merkel.	Queen Charlotte, A.M. 1898.
Gloriosa.	Souvenir d'Antoine Crozy.
Königin Charlotte, A.M. 1898.	Souvenir de Mme. Crozy.

ORCHID-FLOWERED.—Taller growing; truss small; flowers very large, petals soft, crumpled; colours not brilliant.

FOLIAGE DARK.

Flowers orange-red.

Africa.	Pandora.
America, A.M. 1897.	Pluto, A.M. 1907.
Edouard André.	Professor Treub.
Emilia.	Rhea.
La France, XXX 1898.	S. Milland.

FOLIAGE GREEN.

Flowers yellow, marked with red.

Australia.	Hellas.
Austria. A.M. 1896.	Italia, A.M. 1896.
Burbank, A.M. 1907.	Kronos.
Campania.	Perseus.
Champion.	Suevia.

Flowers red, edged with yellow.

Alemannia, A.M. 1897.	Hofgarten-Director Wendland,
Aphrodite.	XXX 1898.
Britannia.	Oceanus.
Heinrich Seidel.	Wilhelm Beck.

Flowers red-orange.

Mrs. Kate Gray, A.M. 1901.	Uncle Sam, A.M. 1907.
Partenope, A.M. 1898.	

WISLEY SCHOOL OF HORTICULTURE.

THE following is a copy of the Report of H.M. Inspector on the Wisley School of Horticulture for the year 1907-8:—

Board of Education, Whitehall, London, S.W. :

September 10, 1908.

Wisley School of Horticulture.

Rev. Sir,—I am directed to transmit the following Report of H.M. Inspector for the year 1907-8 on the above-named school:—

“Provision is made for the training annually at this school of about thirty young men as scientific gardeners, and a diploma of the Royal Horticultural Society is awarded to the successful students at the end of the period of training.

“The course of instruction is designed to cover two years, but as yet only the first year course is in full operation. The course is extremely well planned and is carried out by an efficient staff of instructors.

“The Gardens of the Royal Horticultural Society are extensive and contain a very large variety of plants, both in the open and under glass. There is also a very well fitted laboratory, with good equipment for instruction in the sciences bearing on practical horticulture. The laboratory is under the charge of a well qualified and skilled instructor and the students receive a very thorough training in the scientific side of their craft. This instruction has, at present, to be made very fundamental and in some respects very elementary, as few of those admitted to the course of instruction have received a satisfactory training previously in the rudiments of science. When the second year course is in full operation it will be possible to do some fairly advanced work.

“Originality and thought on the part of the students is encouraged by weekly discussions in the evening, when selected students read papers, which are criticized by the other students, and additional experience is gained by the students in acting on small committees in connection with the arrangements for the Society's shows in London.

“On the practical side students appear to have an unique opportunity of acquiring a knowledge of the cultivation of all the plants that they are likely to meet with in the course of their employment, and those who qualify for the diploma should have no difficulty in securing remunerative posts.

“The Royal Horticultural Society is to be congratulated on the step it has taken to encourage the educational side of the craft.”

I am, Rev. Sir,

Your obedient servant,

F. G. OGILVIE.

Rev. W. Wilks, M.A.

The Diploma of the Society, mentioned in the foregoing report, is awarded to those students who

1. Have completed the two years' course of training in the Gardens and have fulfilled the conditions set out in the Prospectus of the School.
2. Pass written and practical examinations in the Principles and Operations of Horticulture upon the syllabus laid down for study.
3. Present an essay upon some approved Horticultural or Scientific subject.
4. Submit a collection of at least 200 properly dried, named, and localized plant specimens collected *outside* the Wisley Gardens.
5. Submit a collection of insects either injurious or helpful in Horticulture.

Seven students having completed their two years' course, the examinations mentioned under (2) above were held on Wednesday, July 30, 1908, J. Fraser, Esq., F.L.S., acting as external co-examiner. Six of the candidates passed this examination and fulfilled the other conditions, and were placed in the following order :—

1. Mr. Hugh E. Seaton.
2. Mr. Bertram Perry.
3. Mr. G. S. Damsell.
4. Mr. G. Yeoman.
5. Mr. William Brown.
6. Mr. W. Cox.

The Council have appointed Mr. H. E. Seaton to be Assistant-Demonstrator at an honorarium of 40*l.* for the year ending September 1909, and have awarded prizes of the value of 1*l.* to Mr. B. Perry, and of 10*s.* to Mr. G. S. Damsell, and another of 10*s.* to Mr. W. Brown, whose garden plot was considered to show the greatest skill and diligence.

Diplomas have been awarded to the six successful students.

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OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XXXIV. 1908.

PART III.

CONFERENCE ON SPRAYING OF FRUIT TREES.

FRIDAY, OCTOBER 16, 1908.

PROGRAMME.

MORNING SESSION—11 A.M. to 1 P.M.

Chairman.—Colonel Warde, M.P.

Papers.

“Spraying for Fungus Pests.” Mr. Geo. Massee, V.M.H., F.L.S.

“Spraying as an Insurance.” Mr. H. F. Getting, F.R.M.S.

AFTERNOON SESSION—2.30 P.M. to 4.30 P.M.

Chairman.—Colonel Long, M.P.

Papers.

“Washes used as Insecticides and Acaricides.” Mr. F. V.

Theobald, M.A.

“Spraying and Spraying Machinery.” Mr. Geo. Hammond, F.R.H.S.

Morning Session, COLONEL WARDE, M.P., in the Chair.

THE CHAIRMAN: Ladies and gentlemen, I am very much obliged indeed to the Council of the Royal Horticultural Society for giving me an opportunity of being here to-day, and I need hardly say how glad I am to be able to accept its invitation to take the Chair on an occasion like this, an occasion interesting to all of us, but perhaps especially to those who come from the part of the country from which I come, namely, Kent, because in Kent nearly all the land that is not under cultivation of hops

is under fruit cultivation; and that being the case the subject of fruit-spraying must interest the county of Kent as much as or more than any other county. But although it has been the practice in Kent for so long to deal with hop-washing and fruit-spraying, from all I can gather I fear the subject is still in its infancy, and one concerning which we have a great deal to learn, and therefore everyone here must be looking forward with great interest to the papers we have been promised.

I will therefore at once call upon Mr. Massee to read his paper.

"SPRAYING FOR FUNGUS PESTS."

Mr. GEORGE MASSEE: In the first place I should like to emphasize one point, which is that my remarks apply entirely to spraying for fungi



FIG. 63.—SHOWING AMOUNT OF SURFACE COVERED BY SPRAYING WITH (1) A COARSE SPRAY, (2) A FINER SPRAY.

and not for insects. From what can be gathered it appears there is a far greater amount of success attending spraying for insects than spraying for fungi. Possibly most people expect too much from spraying. There is, for instance, an idea that when a plant is sprayed it is perfectly covered all over, that is, if it is well done. This is a serious mistake. The illustrations from photographs of sprayed leaves (fig. 63) show that only a portion of the surface of the leaf is covered. This in the case of many insect pests is practically immaterial. The caterpillar moves along and brings itself into contact with something that causes death; but if the particular part of the leaf on which the fungus is growing is not covered,

of course it goes on developing as before. Again, many people, I believe, have an idea that so long as the spraying mixture, whatever it may be, is evident on the leaf, that leaf is perfectly safe from infection. That also is a very misleading conception on the part of those who entertain it in connection with spraying. I have repeatedly, after the end of a month, when the leaf has been sprayed with Bordeaux mixture, known a fungus to grow perfectly freely on the surface of the Bordeaux mixture. That is a common experience, and not my own only; it can be found in almost every pamphlet dealing with the subject. Again Bordeaux mixture will not prevent the development of a fungus that was present previous to the spraying. Its development goes on much as usual. Numerous instances are on record of that. The common scab fungus causes defoliation all through the season. If you absolutely cover that carefully—I mean, as you can do in the laboratory—with Bordeaux mixture, giving it a far better covering than you get when spraying over a ten-acre field, it goes on just as usual. Many others are the same; it is so with the pea scab and the scab of the broad bean and the scarlet runner. The fungus may be painted over with Bordeaux mixture, but it grows on and comes through, and will propagate as usual in spite of the Bordeaux mixture. That is a point of importance, and it shows the fallacy of holding that so long as the spray is obviously on the leaf your tree is safe. Quite recently an American has been devoting considerable attention to this matter in connection with apple scab; and probably apple scab is the one thing pre-eminent, the thing we are most desirous of preventing, and the thing we are least successful in preventing. He found that by taking apples where the scab was present and covering them over carefully, so that every particle was covered with Bordeaux mixture, from actual measurements the spots under the Bordeaux mixture extended at exactly the same rate as at other places that were not covered at all. This shows that there is perhaps not as much good to be derived from fruit-spraying as we have been led to believe. We expect too much from spraying. In the ordinary course of things when spraying is done some result is expected. The only benefit that can possibly be gained is to prevent to a certain degree the extension of the disease, nothing more.

We imagine when a leaf is sprayed that any spores falling on that leaf will be destroyed. This is generally true so long as the Bordeaux mixture, or whatever other medium is used, remains effective; but no one quite knows how long it remains effective. That depends on many conditions. The most important point is the climate. The spray may be washed off, or it may be induced to undergo such chemical changes that it entirely disappears at a very early stage. On the other hand, I dare say there are plenty here who have done practical work, and can say with perfect truth that they have succeeded, by means of spraying, in preventing an epidemic. Undoubtedly spraying has its benefits, but the benefits, I am afraid, are very much lower than we are generally led to expect.

I am sorry to say at the present day we have reached the point where spraying has become a commercial business altogether. When a man made his own spray solution, whatever it might be, it was most effective, but now we are able to get ready-made stuff. I have not experimented,

so I will not condemn any, except in general terms, and say that the ready-made stuff that you buy is not as good as the mixture you make yourself at the moment—that is, if you make it properly.

Many of the arguments often brought forward in favour of spraying will scarcely bear examination. Some one will write to the paper and say: "I spray my orchard and have not a trace of disease." Perfectly true; there might not have been any if it had not been sprayed. But evidence of that kind is absolutely of no value whatever unless you have some of the orchard left for comparison. Spray half your orchard and compare notes, then you can say whether your spraying has been effectual, and to what extent it has been effectual. You can even go to percentages. I do not think very much of figures; they are not always convincing; still if you have a control, you may take it for granted that other things being equal the sprayed portion of the orchard would have been as badly diseased as the unsprayed if it had not been sprayed, so that if there is any beneficial result it is clearly indicated; but when all the orchard is sprayed, there is no check whatever. It must be admitted, I think, that there are orchards that go through the season without any serious disease. We have not reached that pitch where every orchard is badly infected, by any means.

Another argument urged in favour of spraying is that, apart from the fungicidal properties of the spray, the plant itself is benefited—in what way has not been quite explained. Many people say: "My crop was so much the better for spraying, apart from its fungicidal action; the plants had no disease." This is, of course, generally brought forward, more especially in connection with potatoes. Some people spray, and probably it pays them to spray; they say that the foliage lasts longer, and consequently does more work and gives a better crop, other things being equal, when the crop is sprayed twice during the season. That may be perfectly true. I have no evidence either for or against it. I accept it as a statement; but certainly, so far as spraying potatoes is concerned, I am very doubtful whether any benefit can be derived. The disease comes and appears on one portion of the foliage in a particular part of the field. The spray is of value in preventing the spread of that disease, so it is of value to the extent of checking what would naturally and undoubtedly have taken place if no spraying had occurred; but at the same time we find, I am firmly convinced, that there is not a tuber in Great Britain that is free from the ordinary potato disease. A celebrated German scientist has gone to the extent of saying there is not a tuber in Europe free from it. I am not inclined to argue even on that point. There is one qualification to be made, however; of course with a plant that is derived from seed (into which the mycelium has not been known to pass) the tubers will be free from disease; but a tuber which has been in the ground for more than two seasons in all probability has become diseased, that is, it has mycelium within it. We may have many seasons without any potato disease, practically speaking, but that does not prove that the disease, or conditions favourable for producing disease, is not in the potato. It only means that external conditions favour the potato and check the growth of the fungus. Every practical man knows that it only requires three muggy

or damp days to bring about potato disease simultaneously all over the place. The disease appears, not in one plant in one corner to be carried by wind, or rabbits, or game of any kind from one plant to another, but simultaneously all over the field; and that simultaneous appearance, of course, is against the theory of infection of any kind whatever. This case affords an illustration of a fact that applies in the case of many fruit trees.

Most of you who have done any spraying will admit that Bordeaux mixture is not the perfect success it might be. It is least successful during a wet season, when the epidemic, as a rule, is most evident. It is undoubtedly true that in a damp or wet season you have the greatest amount of disease, and the spray is least efficient for several reasons, for the physical reason that you cannot get it on the foliage to begin with, and if you manage to get it on, the foliage is scorched and falls; so, generally speaking, I should say that, although there is a certain amount of good to be derived from summer spraying on foliage, it is reduced to a minimum, and I should strongly advocate winter spraying instead of summer spraying. Winter spraying is far more important. You may apply far more drastic methods, since there is no fear of killing any part of the plant during winter, than you can in summer, when it is practically certain that the foliage will be scorched if anything in the way of drastic measures be applied.

I may take the peach as the standard of plant or tree that will bear the least strong sprays, or, in other words, that will scorch most readily. On the other hand, I should point out the gooseberry leaves as fairly hard. Much, of course, depends upon the season and upon the degree of hardness. If spraying begins in early spring, or if a plant sprayed is growing in a shady place where the foliage is soft, then scorching is likely to occur and the spray is blamed. If the plant has been exposed to the sun no burning or scorching follows. All these factors have to be taken into consideration. The man who grows his plants in shady places proclaims his failure. The man who has plants growing in the open says the spraying is quite a success. Of course, I believe, no amount of spraying will atone for unclean cultivation. Some people nowadays think, "Well, spraying has been advanced; I will spray them," and put all their energies into spraying and nothing else. The result is invariable failure. I do not want you to take one week, or one year, or one orchard, but take the average together. Have we less disease at the present day than we had before spraying was invented? In America, for instance, if you read the spraying side you think, "Can there be anything left to spray? Absolutely impossible!" But in the Bureau of Statistics Record in all probability the disease is found to be greater and greater every year; but I do not know whether it is greater in proportion to the area cultivated. Of course the area cultivated becomes more and more extended every year, so that if the disease only remained the same, we should get a greater amount. But still diseases do exist, and we have as much disease in Great Britain at the present day as we had before spraying was discovered—that is, in proportion to the greater area. One reason for this is the neglect of certain primary points that were carried out by our forefathers. They seem to have had very much more time than

we have; they got a lot more in; they did a lot more. Probably they neglected some things. They must have done, otherwise they could not have had their conditions as good as ours, and that is expressed by this idea: A man taking a farm to-day says, "I wonder how long it will be before I can retire, having made a fortune out of the thing, and leave it," as you know he would. With the man fifty years ago when he took a farm his consideration was, "Can I live and bring up my family respectably on this farm?" That makes all the difference. The man who wanted to live and continue on his farm put in a lot more work of the proper kind than the man who takes it just as a means to an end, and that end to leave it as soon as possible; and I am afraid that is

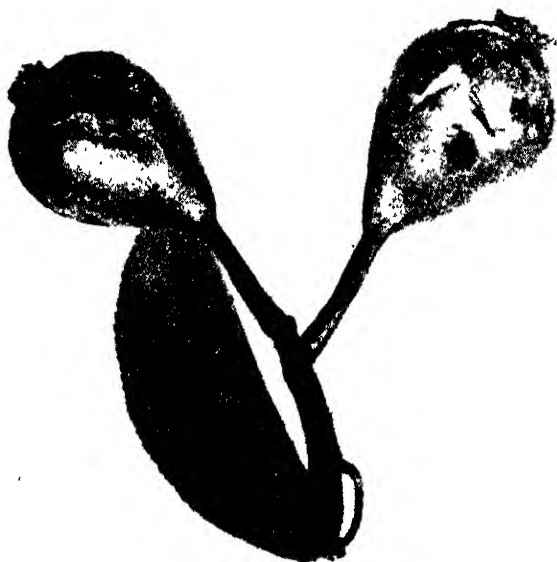


FIG. 64.—PEAR SCAB: THE FUNGUS ON LEAF AND FRUIT.

so with many of us in the present day. The primary object, though not, of course, with all, is to accumulate money.

If you go round the orchards generally in the country you will find a neglect of pruning. A branch here and another there are lopped off and some are thinned out. Now for a while consider the case of apple and pear scab. When the scab appears on the fruit (fig. 64) it begins to appeal to the pocket. The grower never noticed it before, although every penny pamphlet and every newspaper has told him hundreds of times over that it generally begins on dead shoots; on those dead tips that may be seen bristling out on every side of the tree—that is where it begins—then it passes on to the foliage; then the fruit appears, and it passes on to the fruit; so practically if there had been no spores to infect the leaves there would be none to infect the

fruit. Such shoots should be removed of course. No amount of spraying of a dead branch will kill the winter form, especially if it is in the form of living mycelium, which has to make its way out at the proper time. Spraying is absolutely waste of time, waste of money, and waste of energy from every standpoint. If those tips had been removed, and if cleanliness were attended to, an epidemic would become an impossibility; fungus would be there, but not in sufficient quantity to cause an epidemic—it has a perfect right to be there, as much as the tree. You know we take a very one-sided view. We object to the presence of fungus because it goes against our interest. Cleanliness is the thing in almost every case; you will find that in most fungi there is some arrangement for retiring for the winter somewhere, and the thing is to apply as drastically as you can during the winter the various methods that you can apply practically without any fear of doing harm, and then you have less work to do in the summer. You may depend upon it, if you leave the spray, or the preventive method, until the tree is in bloom, nine times out of ten it will be a perfect failure. Of course if you are going to do it in an experimental ground you will probably spray five or six times during the season, and just when you want it, and be perfectly certain. Those are the arguments usually brought forward: somebody has a bad orchard and devotes time to it from their certain standpoint, and they can very truly say, "Look at the perfect success." But what you want to presume is what the every-day grower can apply without any scientific arrangement of any kind whatever. You want it to be to you as simple as sowing seed, or planting a tree, or anything else you are familiar with. Unless the thing can be clearly practicable, so that any ordinary workman can do it, it will, I think, be called a complete failure.

Those are the main points. I am afraid what I have to say will not convince you; but I am perfectly convinced that winter work tells, and if the two could be kept apart—summer work alone, and winter work alone—I believe that winter work would be found more effective than summer work, depending on the particular kind of disease of course. In the case of scab to which I was referring, in every tree which has had scab for several years you will find numerous dead shoots. Those dead shoots in all probability harbour the disease, and the disease very often starts from those points, and follows on to the foliage when the foliage is young. It is only young leaves that can be infected. It is only young growing parts that can be infected. When the part has become rigid, and what is technically called hard, if you are dealing with foliage, then it becomes no longer possible, or, if it is possible, the fungus produces only insignificant blotches which do not interfere with the general work of the foliage in a given tree. The spray that has perhaps proved as effective as any for winter use in connection with apple and pear scab is sulphate of copper—one pound of sulphate of copper in twenty-five gallons of water. You want to spray everything—not only the tree, but the surrounding ground and everything near. Spores may reach anywhere. It may be a mycological myth to say they do so, but I think you will all admit one thing: if you had not spores floating about you would not have the disease. I do not suppose anyone argues that the

disease is one of those visitations that come about in some indefinable way without a definite reason for its appearance.

Trees that have been sprayed in Mortlake Orchard, carefully pruned—I know you would say this is a laboratory experiment—all dead parts cut away, twice sprayed during the winter, along with the surrounding ground, with this sulphate of copper solution, pure and simple, have been more free from scab than surrounding trees that have been sprayed in the orthodox manner, beginning with soft foliage when you cannot use Bordeaux mixture except in its diluted condition. If you begin on young foliage you are reduced to two things: either use Bordeaux mixture in such a diluted condition that you know in your own heart it does no good, or use it stronger, and you are equally convinced it will generally burn the foliage.

Finally, in connection with sprays. We speak of “sprays,” and unfortunately that up to the present is far from the ideal. The ideal is water vapour, the kind of thing that comes from the spout of a kettle of boiling water. If we could have that it would settle down all over the upper side and under side, and remain, if you stop spraying at the right moment; but all our spraying machines, even the very best of them, send out the water in obvious drops to begin with. These drops unfortunately have a tendency, as you know in the case of rain on a window, to run together and form larger drops; that is why you do not get your leaf equally sprayed all over. The longer you spray the worse it becomes. That is, the drops are larger, and a less surface of the leaf is covered; and it is important to remember that the water does nothing; it is the stuff in solution with the water. Unless the spraying material remains on the tree, and the water evaporates, leaving whatever it may have held, the spraying is a failure; and it is very important to know when to cease spraying. The longer you spray the less material you get on the leaves; and then if you conscientiously, and without any bias, examine any tree that has been carefully sprayed you will see that in 90 per cent. the upper surface of the leaf has ten times more stuff on it than the underside. There are all sorts of reasons for that. One important reason is, as a rule, although the upper surface of the leaf may be almost as smooth as glass, as in the case of ivy, the under surface is not. It may look smooth, but if you magnify it you will find it is covered with a more or less dense mass of hair, or very fine silk, and the spray never touches it. It is rather important that the under surface of the leaf should be sprayed—in fact it is very important—rather than the upper surface of the leaf. That is the difficulty we are in. Of course that is a point for some manufacturer to solve, to get a finer spray. If we could get a spray similar to London fog there would be some hope that it would settle down equally over both the upper and lower surfaces of the foliage.

THE CHAIRMAN: I now propose to ask Mr. Wilks to read Mr. Getting's paper, and at its conclusion I will call on anyone who wishes to discuss the matter.

"SPRAYING AS AN INSURANCE."

MR. H. F. GETTING : I could not refuse the honour of an invitation from the Royal Horticultural Society to read a paper on the subject of spraying fruit trees. But after seeing the names of the able scientific men as speakers I feel somewhat diffident in speaking at all, and have devoted a portion of my paper to suggestions and queries, with the object of promoting discussion, which I consider of the greatest importance, especially at a meeting like the present one.

Each year, as my experience increases, I feel more strongly the necessity of spraying regularly, not waiting until a severe fungus or insect attack is apparent, but, with very few exceptions, in anticipation—in fact, just in the same way as we insure ourselves or our property against various risks—for it is impossible on a fruit plantation of any size sufficiently carefully to examine the fruit trees or bushes to see if an attack is present in the early stages. I say this as a general rule, to which there are possibly exceptions. We may, of course, be guided to some extent during pruning by the number of *Psylla*, or winter moth eggs, or signs of the winter form of scab on the young growths; but, as a rule, when the attack of an insect or fungus is discovered on the trees by the ordinary fruit grower it is in an advanced stage, which renders it far more difficult, if not impossible, to deal with. For instance, spraying to destroy aphides is generally commenced far too late.

The plum aphid should be sprayed at least once (better twice) when the bloom buds are swelling, so as to destroy as many of the mother aphides as possible. Each surviving mother aphid may mean many thousands of progeny during the year. A great scientist calculated that the progeny of a single female might in one season amount to close on one million. The apple aphid also should be sprayed before the blossom buds burst. It is money wasted to spray when the leaves are curled, and it is extraordinary how quickly a few aphides cause a leaf to curl.

Then, again, with apple scab; unless the trees are sprayed before coming into blossom the chances are very much against effectually checking an attack.

Apple sucker, or *Psylla mali*, is a pest that is becoming more troublesome from year to year. I have not been able to find a wash that is really effective against this pest. A fairly strong paraffin and soft-soap emulsion, nicotine wash, and some other washes all kill some, but they leave far too large a proportion alive. One of the principal difficulties with this pest is that in an ordinary season the hatching period is prolonged over several weeks, and I have not yet come across a wash that kills the eggs.

The question then arises, Is it worth the annual expense of spraying? My opinion is, under certain conditions, decidedly "Yes." The principal conditions are:—

1. That the spray fluid must be capable of destroying a large proportion of the insects, or keeping in check the fungus against which it is used. I honestly say I have wasted thousands of gallons of wash on account of its ineffectiveness.

2. That the spraying machines and those who use them are capable of rapidly and efficiently doing their work.

As regards the first point, fruit growers are labouring under immense disadvantages compared with growers in most other civilized countries, more particularly compared with the United States of America and Canada, where really practical and scientific advice and ocular demonstrations can be had for the mere asking. If it were not for one public-spirited nobleman, the Duke of Bedford, and a few men of science actuated by a like spirit, we should have to learn what we could from abroad or by our own individual experiments. Until there is a properly constituted sub-committee of the Board of Agriculture to deal with all matters of interest to fruit growers, and one or more Government Experimental Fruit Stations, managed by practical men, assisted by the best scientific advice, it will continue to be a very uphill fight for fruit growers. It is not a party question; it is one that affects fruit growers and fruit consumers of every shade of political opinion, that a sufficient supply of really fine fruit should be produced in their own country.

When I look at the minutes of evidence taken by a Government Departmental Committee in the year 1904, evidence given by the leading fruit growers and experts in the United Kingdom, and filling over 500 closely printed pages, and remember that the recommendations of this Committee have been utterly ignored, I cannot but think that such procedure on the part of those responsible is, to speak mildly, not business-like.

I may be excused for straying from my subject, but this appears to me a matter of such importance that fruit growers should not allow it to drop.

To come back to the point that the spray fluid should be capable of destroying a large proportion of the insects against which it is directed. We must not for a moment expect that any wash will destroy more than a large proportion and keep the pest in check. I wish that some of the fairy tales which are sometimes advertised were facts, as I heard it very pertinently remarked of a certain wash which, it was stated, would destroy nearly all harmful insects and their eggs. Only one thing is omitted from the advertisement, and that is the promise that the wash would not destroy beneficial insects. Such advertisements as this defeat the ends of the advertisers and do an immense amount of harm.

Washes require very thorough testing for a prolonged period, under varying conditions, before it can be fairly stated that they are effective.

The next point is the efficiency of spraying machines and nozzles. Many of the spraying machines have insufficient capacity and pressure. The same nozzles do not appear suitable for damping all parts of a tree, owing to their being so fixed to the spray arm that they can spray only the top or lower portion of the tree thoroughly. A nozzle is required to spray in a direct line of the spray arm for the tops of trees, and at right angles to the spray arm for lower branches. Nozzles might be made to effect this double purpose, or perhaps there is one already on the market.

In connection with this point, viz. spraying trees thoroughly, more knowledge is needed as to the quantity of wash required thoroughly to spray a tree of a given size. To say, stop spraying when the fluid commences to drip from the leaves, may be very misleading. A part of

the tree, especially the lower branches or the portion nearest the operator, may be drenched, and the remainder left practically untouched. This no doubt largely depends on the operators; but unless there is an expert to point out the mistake, spraying is liable to be condemned, simply because the trees have only been half sprayed.

Now as regards a few spray-fluids in use.

Bordeaux Mixture.—I take this first because it appears to be generally acknowledged as the mixture above all others to be used against certain very destructive fungi, notably apple and pear scab and brown rot, which are doing an untold amount of damage in this country and rapidly increasing. I have tried this wash many times and know that it is beneficial. At times I have secured first-rate results, but at other times the results have been lamentable—badly scorched foliage and sickly trees for a long period afterwards. Why, I cannot tell you. The strength used is what is commonly called “the normal,” and also a slightly weaker strength. The sulphate of copper and lime have been carefully weighed and mixed and the wash kept agitated, and yet great damage has been done. Sometimes this damage does not show for days after. Is it the fault of the lime, the copper, or the operator? There is no expert to inspect and say where the fault lies.

Liver of sulphur is generally looked upon as a fungicide only, but I have found it in one instance to be an excellent insecticide, viz. against the mealy aphid on plum trees. A solution of soft soap and 12 ounces of liver of sulphur to the 100 gallons will effectually destroy this troublesome pest.

Nicotine and Tobacco Washes.—I am inclined to think that these may prove of great service if the cost can be considerably reduced. Nicotine of about 98 per cent. purity is admitted free of duty; but it is expensive, costing about 10s. per lb. Denatured tobacco is also admitted duty free; but there is, I understand, a good deal of foreign matter in it, and the strength of the tobacco may vary immensely. The importation of tobacco juice is prohibited, though if it were practicable to denature it and admit strong tobacco juice, not containing less than a fixed percentage of nicotine, I think it might be very useful to fruit growers.

Paraffin and caustic soda are sometimes recommended to be used very strong. I would caution users to try on a small scale first and carefully watch results, bearing in mind that damage done by paraffin does not always show quickly.

Penetration of Washes.—I have observed this year in spraying for *Psylla* that one wash (McDougall's) appeared to penetrate more than others—i.e. the fluid seemed to have the power of running between the flower buds, whilst other washes remained more on the upper surface or tops of buds. I regard this as worthy of attention.

Adhesiveness of Washes.—It is desirable with certain washes (Bordeaux mixture and others) that they should remain on the trees as long as possible. If some improvement could be made in this direction it would be a gain.

Cost of Washes.—It is important to growers that the cost should be kept as low as possible; hence the necessity of ascertaining the lowest

effective strength of washes. As some washes are difficult for growers to make, might I suggest to vendors of washes that they should be sold in as concentrated a form as possible, obviating the necessity of paying unnecessary rail carriage?

With regard to chemicals purchased for mixing one's own washes, a guaranteed strength should be stated on invoices and insisted on by purchasers, or trouble is likely to occur through variation of strength.

Spraying Installations.—It would be interesting to know what is the best system for a fair-sized plantation. At Glewstone Fruit Plantation, owned by Mr. J. Martin Newton and myself, for an area of about 25 acres our system is as follows: We have a small house near a stream with a $1\frac{1}{2}$ h.p. Crossley oil engine and a 600-gallon tank sunk below the level of the stream which can be thus rapidly filled. There is an iron underground main pipe from this tank along the principal headland with taps at intervals. To these taps we connect at right angles 15 feet lengths of iron piping on the surface of the ground along a row of trees; to this iron pipe are fitted four 60 feet lengths of indiarubber hose, with spraying arms and nozzles. This enables us to spray twelve rows of trees (say 500 trees) without shifting the iron pipes, so that we can easily spray 2,000 to 2,500 trees a day. The disadvantages are:—

1. Amount of wash held in pipes.
2. Wear on indiarubber hose through dragging on ground.
3. Settlement of insoluble material in pipes.

Can anyone suggest an improvement on this system?

I sincerely hope that our splendid Society—the Royal Horticultural Society—will make experiments in fruit tree spraying, and will also have at one of their shows a representative exhibition from all parts of spraying machines and nozzles.

Another suggestion I would make is that a representative body of fruit growers should visit the United States and Canada, and study the question of fruit tree spraying and kindred subjects, and give the British fruit growers the benefit of their observations.

My one hope and desire is that some practical results may spring from this meeting.

In conclusion I would say, "If you spray, spray regularly, spray thoroughly, spray systematically, or don't spray at all!"

DISCUSSION.

THE CHAIRMAN: I have no doubt, after listening to the very interesting papers which it has been our advantage to hear to-day, that it must have given rise to a great deal of thought in the minds of all of us, and perhaps to doubts in the minds of some. I confess that as far as my layman's mind goes one doubt has been raised by a remark which Mr. Massee interjected more than once in the course of his paper. I have always been given to understand that if we did not preserve foxes there would be no fox-hunting, and that if we did not preserve pheasants, there would be no pheasant-shooting. Mr. Massee seems to have a sneaking affection in his heart for fungus; for I noticed in the course of his remarks that he pleaded for fungus—to give it a chance. It

occurs to my mind that Mr. Massee looks upon fighting fungus as sport ; otherwise I imagine that if we do away with fungus there will be no disease. The meeting is now open for the discussion of the papers brought before it.

Dr. GATHERGOOD (Wisbech) : I think we have to thank Mr. Massee and Mr. Getting for the papers we have heard to-day. I have come about 140 or 150 miles this morning, and I must say that I feel a little despondent—not as regards the papers we have heard read, but as regards the information we are seeking. During the last ten years I have spent, I think, hundreds of pounds, perhaps thousands of pounds, on spraying. Hitherto the result has been but little ; but I think that if we could get some consensus of opinion amongst the growers themselves, giving us the results of any benefits they may have received from individual appliances or dressings, it would be a great help to the fruit industry. First, as regards the fungi, we all know the damage we suffer from them, and the damage is very serious, and, as Mr. Massee has already said, it is increasing very rapidly. And I am sure that his recommendations for winter work ought to be fully carried out—I mean as regards the pruning out of dead branches. But the far greater damage that we are suffering from to-day in the Wisbech district is from insects, especially from the aphides, the apple sucker, the caterpillar, and the apple blossom weevil. The last has worked very great havoc with us in the Wisbech district. I will now give you the result which I have had from spraying ; and I do not think you will have much trouble from the apple sucker if you adopt the method which I have found very successful. I have cleared nearly 100 acres of orchard from apple sucker during the last year ; previously to that it had been very badly infected for years ; and the method I adopted was to use the winter spray of ordinary caustic wash with a considerable proportion of petroleum and soft soap. With the first dressing I cleared perhaps 50 to 70 per cent. of the apple sucker in the first year. Last year I finished the apple sucker off ; and I cannot find a trace of it to-day in my orchards. I take it that if any grower could give us any experience similar to that it would be a great benefit to us as a body of fruit growers. It seems to me very evident that if we cannot stop the ravages of these insects we must stop all our orchards and give over fruit growing. Still I hope remedies may be found which will prevent that calamity.

Question : May I ask the Doctor what percentage of caustic soda was used ?

Dr. GATHERGOOD : I used 8 lb. of caustic soda, 8 lb. of caustic potash, and about a gallon of petroleum to 80 gallons of water.

Question : But what grade of caustic soda ?

Dr. GATHERGOOD : 98 per cent.

Question : Do you think that using caustic soda and potash without petroleum makes any difference—I mean, would you have any results with only caustic soda and potash ?

Dr. GATHERGOOD : No, I think not.

Mr. SALMON (Wye) : Various points have cropped up on which I should like to offer a few remarks. Mr. Massee showed us photographs of a badly sprayed leaf and a well-sprayed leaf. I think that much of the

result of spraying depends on the form in which we put the spray on the leaf. I am now confining myself, as Mr. Massee did, to spraying for fungus diseases; and I should say that the photograph which is shown of a well-sprayed leaf is not what we should aim at. We can get nozzles now which throw a spray so fine that if you photograph the leaf there is practically nothing of the mixture to photograph, because it is sprayed over so finely that it is left in the form of an almost impalpable dust. The Bordeaux mixture put on with a proper nozzle is as evenly distributed over the leaf as dust is by the roadside. I think this is a very important point indeed, and I want to impress upon growers the fact that when they are spraying they must aim at that appearance of the Bordeaux mixture on the leaf—no large spots, but a kind of powder. The spraying machinery and the nozzles are as important as the spray itself.

Mr. Massee mentioned that he had noticed the spores of fungus germinating on spots of Bordeaux mixture. Of course there is no reason why the spores should not germinate on any surface. But the whole point is, whether the germ tubes of those spores would be able to penetrate into the leaf on the spots of Bordeaux mixture, or whether they would not be able to do so. The mere fact that spores are able to germinate on Bordeaux mixture must not be used as an argument against the value of Bordeaux mixture. Then also the fact that a scab of apple covered over with Bordeaux mixture will go on extending, must not be used as an argument against the efficacy of Bordeaux mixture, because, as Mr. Massee himself said later on, Bordeaux mixture must be looked on as a preventive. It should be on the parts before the fungus is about. I think it is very important not to allow any arguments to be put forward against Bordeaux mixture without examining them closely; for we must remember that Bordeaux mixture, after all, is the best fungicide yet invented; it has its faults and it is not perfect, as we know. You get forms of injury such as scorching or the shot-hole appearance of the leaves and a yellowing of the leaves. You get all these things, but still we have in the Bordeaux mixture the nearest approach to the perfect fungicide. Notes are sometimes given as to the ill effects of Bordeaux mixture by growers, but it is very necessary indeed to look into them carefully before we accept the injury as due to the Bordeaux mixture. I will mention one such case which came under my notice. It is constantly said that when leaves of Cox's orange pippin are sprayed with Bordeaux mixture they fall off. In many cases, but not in all, there were no control plants of Cox's orange pippin standing by which had not been sprayed; and in many of those cases I feel sure that if there had been some controls it would have been seen that the leaves had also fallen from the control trees. I have repeatedly found in the plantation at Wye College that the foliage was so tender that fungus got on to it and the tree became defoliated, whether the leaves were sprayed or not. I am very glad indeed that Mr. Massee emphasizes the importance of the grower making his own fungicide, especially Bordeaux mixture. We can only hope to get good results from Bordeaux mixture by the grower making it himself. There is not time now to go into the details of why this is so; but I want to express my entire agreement with

Mr. Massee when he says that one of the essential conditions of getting the full good results from Bordeaux mixture is to make it at home.

Personally, and as the result of experiments during the last two years especially, I have found spraying potatoes with Bordeaux mixture gives unmistakably the most valuable results—in this year especially. One could have seen that the sprayed potatoes at Wye College in the beginning of September were going on growing vigorous and green, and the crop increasing; while the unsprayed foliage was flat on the ground. I rather thought that the good effects of spraying with Bordeaux mixture had long passed the experimental stage; that it was long adopted in England and in foreign countries as an undoubted normal part of the cultivation of potatoes.

Mr. Massee mentioned, as regards peaches, that it is very difficult to get anything to spray them. Of course that is so with the old fungicides. Bordeaux mixture on peach leaves is almost impossible to use, however diluted you have it. I should like to call the attention of those who are interested in growing peaches to a new fungicide, the self-boiled lime-sulphur mixture which has been discovered in the United States. The Department of Agriculture recently issued a Bulletin upon it. It is perfectly safe to use on peach foliage; and they put forward its claims, not only as a fungicide, but also as an insecticide.

I find myself in disagreement with Mr. Massee on the subject of when you should spray against fungus diseases. I am absolutely certain that no commercial grower of apples can ever hope to combat apple scab without spraying in summer. Theoretically, if you could in the winter stage cut off all the young twigs, then you could deal with the disease; but going round an apple orchard and cutting off the diseased young wood is not practicable. Spraying is. We heard Mr. Massee himself say that spraying in winter against apple scab is of no use. The only alternative would be pruning off the diseased shoots in winter, and that I am sure would never keep down apple scab. I think the very existence of commercial fruit growing in England depends upon the methods of spraying that we are going to adopt. I am more and more convinced, as I see more fruit growing, that apples will never be grown in this country permanently clean—at least many varieties of them—without continual spraying. We shall soon reach I believe a time when this can be done quite economically. When hop washing first came in it was said that it would be impossible to wash hops by the acre. We have not got machinery for washing fruit to such a perfect pitch as that for washing hops, but I am sure that it will arrive. At present there are English makers sending out excellent English machines; and growers can also obtain imported machines from the United States—which are the very latest things for spraying—and there is no reason why we should not go ahead in the washing of fruit economically and scientifically.

The only other point I wish to mention is to endorse what Mr. Getting said in his excellent paper, and that is, that the great need at the present time is a Sub-Department of the Board of Agriculture to look after these most important questions for the commercial growers. As an alternative, Mr. Getting suggested that a body of fruit growers should go over to the United States and learn for themselves. Perhaps if a body of English

fruit growers came forward and said, "We must go over to the States and find out what they are doing there in order to grow clean fruit," that would shame our Government into doing something for us here. It might have that effect in connection with pressing forward for this reform.

Mr. BAKER (Meopham): There is just one point I want to mention, and that is the question of home-made mixtures—I will confine myself more especially to the Bordeaux mixture, to have one point settled at once if possible. There is no doubt whatever that the home mixing of Bordeaux is the best thing. When one has access to a laboratory and if one is a chemist it is undoubtedly the best thing. Thirteen or fourteen years ago I made the most careful experiments, and the results were excellent. Since then I have become a practical grower, and I find that home mixing is not nearly such a success—indeed often a failure—whereas when I could do the thing scientifically it was undoubtedly best to make one's own. Then comes the question, Why is this? It is quite easy now, but it was not fifteen years ago, to get pure copper sulphate, which is easily soluble, but it is exceedingly difficult to get the right lime. Lime is of course burnt chalk or limestone, and should be obtained directly from the kiln. In contact with air it very quickly goes back chemically to its original form, and is then a very different substance from quicklime. The difficulty of getting pure lime seems to be almost insurmountable. In making Bordeaux mixture it is most essential that the copper sulphate should be dissolved separately from the lime. When the hydrate of lime is cool, and then only, must the two be mixed. If the mixing be done before the lime has quite cooled a very different chemical compound will be formed. If I make this for my own experiments I take the utmost care that the lime has cooled; but the labourer does not always do exactly as he is told, especially when his master is not present. Even if you have got pure lime it is exceedingly difficult to get the mixture quite right. You tell your employé to hydrate the lime to-night, and to be sure that he does it to-night in order that it may be ready for the morning; he sometimes forgets—he does not realize the importance of allowing the lime to cool—at any rate many of them do not allow the cooling, and in the morning when the two are mixed bad results follow. That is the chief cause of the failure of the Bordeaux mixture. Bordeaux mixture properly made of the right material, and properly put on with the best machinery, is undoubtedly the best fungicide we have. But unfortunately the practical grower has to contend with the antagonism or laxity of the labourer. In order to get over this difficulty, for some years I have endeavoured to devise something else. It has been suggested to use sodium carbonate, because, as everybody knows, washing soda, which is a form of carbonate of soda, is easily obtained. To a very large extent, ordinary washing soda in sufficient quantity will take the place of lime—in other words, we may use washing soda as a substitute for lime. There is not the heat developed. If I had not somebody in whom I placed absolute confidence I think I should be inclined to use washing soda: it does not cost very much—you buy for a shilling or very little more what will answer for making a mixture of 100 gallons for an acre of potatoes. But washing soda

or sodium carbonate has the disadvantage of giving sodium sulphate as a by-product, and sodium sulphate is admittedly highly injurious to vegetation. In order to get over that—as an experiment—during the last year or two I have used with very great advantage potassium carbonate, which is, of course, dearer; but the resulting product is sulphate of potash, which is a valuable substance for potatoes. The potatoes I have had raised in the last few weeks have been greatly benefited, whereas the ordinary crop would be a very poor one. I have poor cultivated land, which is assessed at 5s. an acre, and I have had this season 14 tons 18 cwt. to the acre. That is on land said to be some of the poorest in the kingdom, and the result was obtained by the aid, to some extent, of modified Bordeaux mixture made with potassium carbonate instead of sodium carbonate or quicklime, and there was almost no disease.

While dealing with the spraying substance Mr. Massee and, to some extent, Mr. Salmon have referred to the importance of completely covering the leaf. Now is it not a fact that if small quantities of Bordeaux mixture are thrown on the leaf in what we may term a weak form of spray that substance remains on the leaf in a difficultly soluble form—it is for the most part insoluble—but the conditions which enable the spore to germinate take effect when the weather is damp. Surely the conditions which are essential for the germination of the spore are the very conditions which are also essential for the bringing into solution of a very minute quantity of the basic sulphate of copper, which is really the result of the application of the Bordeaux mixture, so that I maintain it is not necessary to clothe the leaf, as it were, with a mackintosh and to thereby almost prevent assimilation. But the small amount of material put on with the best apparatus, even if it does not completely cover the leaf, will yet act as an effective preventive against the various fungus pests. I might also say that in the last few years, inasmuch as nearly all our fungicides, especially Bordeaux mixture, are so insoluble, in order to make it more penetrating I have with very considerable success added ammonia. The result of adding ammonia will be to dissolve the copper compounds; and there is no doubt whatever that it is far more penetrating and far more effective in reaching the under surface of the leaf, which, as Mr. Massee told us, is somewhat difficult to do.

Mr. PERCY BUNYARD: In regard to petroleum and paraffin, so far as my experience goes, they are absolutely out-of-date, and I will tell you why. The very fact of their being of an oily nature is conclusive that they are not sufficiently penetrative. I was very glad indeed to hear Mr. Getting mention nicotine. Nicotine is a most penetrating insecticide. Nicotine from its very nature, being a vegetable alkaloid, will get into those parts which oil and paraffin emulsions cannot possibly penetrate. I should like to hear Mr. Massee's opinion in regard to nicotine, and I should very much like to know if he has ever experimented with it.

With regard to spraying machines and nozzles I must agree with the remarks of our lecturers, that at present we have nothing which makes quite such a fine spray as London fog, and I doubt very much, if anything did make such a fine spray whether it would reach the underside of the

leaf. In fact, I think if you will examine a fruit tree in London after a London fog you will not find nearly as much deposit on the under side of a leaf as you will on the top side.

Mr. NEAME: As there has been some little doubt about the efficacy of spraying with Bordeaux mixture for scab, I should just like to make a few remarks about my own experience. I first used it five or six years ago on a few trees. While hitherto for two consecutive years I had picked hardly any sound fruit, the first year I made the acquaintance of Bordeaux mixture I tackled it by spraying the trees in the winter, once before blossom and twice afterwards. That year I had a fairly sound crop. For the last three years I have had a good sound crop of fruit with hardly any scab on them. The spraying, as far as my experience goes, is certainly better done in the summer. If I had a very bad attack I should be inclined to try it in the winter too; but the first spraying should be done just before blooming and the next one as soon as the blossom has fallen. Those two sprayings should be sufficient, unless in an old and badly attacked orchard. I have had further experience this year; I wished to put off my spraying till the last moment, so as to make it last longer into the summer; and I did not put on the Bordeaux mixture until I saw a few signs of scab on the leaves, and, of course, then it was undoubtedly too late. Instead of getting a good crop of sound apples I only got a small crop of very scabby ones. It appears to me that the second spraying with Bordeaux mixture should be as soon as ever the blossom is falling. The Bordeaux mixture I always prepare myself. The lime is mixed up with a bucketful of water, and the mixture is poured into a big tank where the copper sulphate has already been dissolved, and that seems to give very good results. In most apples I do not get any scorching, and I get fairly good results with regard to the curing of the scab. To produce thoroughly good apples I should undoubtedly say that Bordeaux mixture must be used; and in regard to pears that good pears can hardly be grown without the use of it. There are certain apples, of course, to which this remark does not apply, which do not appear to be attacked by scab; those, of course, growers are probably acquainted with.

Rev. GEORGE ENGLEHEART: As time is short I should like to bring a small concrete instance before the meeting, because what I think we want is absolutely concrete instances, and we want advice; we want either help or discouragement according as it can be given. I had a very great deal of satisfaction in listening to Mr. Massee's able but eminently discouraging address, because it coincided so entirely with my experience in the way of discouragement. My case is one of Cox's orange and the leaf-spot. I live a few miles west of Salisbury; and in the whole of that district we are suffering the very greatest damage, a progressive and increasing damage, every year from the apple-leaf spot—that spot which was so excellently described by Mr. Chittenden in the last issue but one of the Society's JOURNAL. I have had a great deal of illuminating correspondence with Mr. Chittenden, who has been very kind indeed to me in the way of writing. His paper was such an excellent paper as regards the diagnosis of the disease that in itself I think it quite justifies the existence of the Wisley Laboratory. My experience in the matter is

this : seven years ago I planted (apart from some old orchards which I had) on new ground something over an acre of young apples, mostly Cox's; they were just where the greensand joins the gault. We have an intermediate loam, beautiful land, with a slight tilt to the south; and for the first few years I do not think there were better trees to be seen in the whole of the county, and everybody who came there agreed. When they first came into bearing I brought up two dishes to the Royal Horticultural Show and I got first prize with my first dish, and I could very easily, I think, have got first prize with my second dish. About four years ago the leaf-spot began to appear in our neighbourhood. I think mine is a very good illustration of a case of trying to grapple with the disease, because the trees are cultivated in a large open field where my bulbs are growing, and I think I may say that no piece of ground could be kept more scrupulously clean or be treated better in every way with regard to the first planting of the trees and the subsequent management. I very much want to get hold of some practical help with regard to this leaf-spot. We have tried winter spraying, we have tried summer spraying, and I think I have tried every recipe. I know very well what the symptoms of the disease are, but up to the present time I have not been able to get any remedy at all. We have sprayed very carefully and well in the winter; we have sprayed in the summer with Bordeaux mixture, with sulphur, liver of sulphur, and with one or two other things, including a very much advertised summer wash. We made our own Bordeaux mixture, and I do not think, *pace* Mr. Chittenden, that we made it too strong. I think that if we made it much weaker we should not get a chance of killing the fungus, which is very virulent indeed. I found that we either covered the top surface of the leaf entirely or we did not cover it; but whenever it was fairly well covered I found on examination that the spores, as Mr. Massee has said, germinated very freely on the surface. I wrote to Mr. Chittenden, and he told me that the under-surface of the leaf should be sprayed. I do not quite know how that is to be done, but if it is done I am very strongly of opinion that what Mr. Massee says would come to pass, that the leaf would be practically choked. It would be in the position of those unfortunate children who were once sized and burnished for a religious procession, which was very effective; they shone and they looked very natural as cherubs—but they unfortunately died. Well, I very much want someone to tell us something of his practical experience of Cox's orange and this leaf-spot. I am in the position of having done everything I think that could be done for it—taken all kinds of advice and used such common sense as I may or may not have—and we can do nothing at all with it. I am very anxious to hear whether anybody has any practical experience in the matter of combating this very injurious leaf-spot on our most valuable dessert apple, the Cox's orange.

Mr. COLLINGE: I have just a few remarks to make, and that is in connection with the much-discussed question of Bordeaux mixture. I have been having a series of experiments lately on different Bordeaux mixtures, upwards of twenty, that have been obtained from makers in different parts of Europe, and I have submitted them to two chemists, and they agree with me that, so far as representing them to the fruit grower as substances which can be used with any efficacy, they are

practically useless. Now I agree with all that has been said as to Bordeaux mixture. I am not pretending that Bordeaux mixture is useless, and I think as the outcome of this meeting we could form a small committee that would go into this—all those interested in the fungi and those who are chemists—and they could recommend to the fruit growers something very much better than is used at present. Those who have read Mr. Spencer Pickering's able paper on Bordeaux mixture must see there is something radically wrong with the Bordeaux mixtures on the market and the way they are made. I think the failure of the Bordeaux mixtures is due entirely to the way they are made and the copper that is sold. There is one point which Mr. Massee mentioned—what I call the wetability of fluid on the leaves. I agree with Mr. Salmon that the two leaves thrown on the screens were not well sprayed. I think the lumps should be much finer and more equally distributed over the leaf. I should suggest to those interested to try experiments with different gums. I have sprayed little plates of mica and also celluloid discs and examined those microscopically, and we have got the greatest wetability with certain solution of gums. We have not exhausted them. We shall go on trying various gums, and I have no doubt a gum of some kind will give the greatest wetability that is possible to be obtained. I should like to thank Mr. Massee for his paper, and say that I support very many of the points he has made, though there are some from which I strongly dissent.

Mr. CROOK : I am very much interested in this question of spraying. It gave me much pleasure to hear the able papers read this morning, and, like Mr. Getting, I believe the success of fruit-growing depends on using the applications earlier. In point of fact, I have used a well-known wash for over ten years, and I have always found that in using that wash, if I used it somewhat weakly before any trace of the insect appeared, it was easy to keep the plant clean by one or two applications during the year ; but, unfortunately, the majority of people allow a crop of insects to congregate, or wait till they can see them, especially aphides of all kinds, and then they begin to apply any kind of wash they like ; they apply it very strongly. Like most of these things, as with a doctor's physic, it depends how much you have and how strong it is, whether it will kill you or not ; so with these washes ; it depends upon how strong you use them, and when you use them, whether they kill the insect, or leaf, or both. I am quite convinced from close observation that if any of these washes are used early on soft vegetation before a crop of insects comes, and used about twice, you will keep the plants clean through the season, whereas if you once allow the crop to present itself you meet with a series of difficulties the whole of the year. I am also prepared to say that as regards amateurs and small growers, of whom there are now many—and this Society has to study the amateur side of the question—the sooner we can teach people who have not much knowledge of horticulture the benefits of using these insecticides, or home-made washes, whatever you like, weakly in the early stages the better. If the insecticide be applied before the insect is seen, and a couple of times, you ward off the attack naturally before it has become severe.

THE SECRETARY: It is now just upon one o'clock, and before Colonel Warde bids you good-bye I have to say this: Colonel Warde has been very kind to come here and take the Chair. We all thank him heartily.

Colonel WARDE: I am very much obliged to you indeed that you think it worth while to say anything to me in the way of gratitude for taking the Chair, but I am sure, after the most interesting and able papers given us this morning by Mr. Massee and by Mr. Getting, we shall all, at any rate a great many of us, go away wiser than we came. For myself, as a layman, I listened with the greatest interest to what has been said, and I hope that I may have received a few wrinkles that may be very useful to me in the future; but, as Mr. Wilks has reminded you, I am obliged to put a time limit, at least as far as I am concerned, because I have to go to the House of Commons. (Applause.)

THE SECRETARY: There were one or two questions asked of Mr. Massee which he would like to reply to without raising any discussion afterwards, or else we shall not get any luncheon. I think you would like to listen to Mr. Massee's reply to those questions.

Mr. G. MASSEE: There was one that was raised by Mr. Bunyard in connection with nicotine. Nicotine has no bearing on fungi, so that I cannot criticize it. I have never used nicotine; I do not know what its efficacy or otherwise is in connection with fungi. Of course with insects undoubtedly it is very different, but I can offer no opinion whatever on that. Another point perhaps I am taking out of Mr. Salmon's hands; but he mentioned the American wash. I happened to put the pamphlet in my pocket, and I have used the wash simply out of curiosity to find whether it would or would not scorch peach foliage. The compound is this: 10 lb. flowers of sulphur and 15 lb. of stone lime dissolved in 50 gallons of water; 9 or 10 gallons of water, more or less, are added to the lime and sulphur to dissolve it and to bring it up to the boiling point. Then dilute it to 50 gallons. The heat of the slaking is sufficient to bring about combination with the sulphur. If you actually boil it, or even have hot water instead of cold, the damage may be rather serious. I simply sprayed to try its effect on the leaves, not its action on fungus—that I took for granted. I used the most delicate leaves I could suggest, that is, peach, and I found there was no damage done whatever—not the slightest. I thoroughly coated the leaves over, of course intentionally, with a thick washing, and repeated it several times.

QUESTION: Where can we get that pamphlet without picking your pocket?

Mr. G. MASSEE: The American Department of Agriculture, Bureau of Plant Industry, Circular No. 1.

The only other point is in connection with winter work. Admittedly, if you had no fungus spores you could have no disease. I suppose we are all agreed on that. The disease does originate from spores. Mr. Salmon said it was not quite practicable to prune away the dead branches. I have said that if you pruned away practically all the dead branches then there could be no beginning. The fungus would be there in a certain proper proportion, to keep up the balance of nature perhaps, but not sufficient to form an epidemic; we do not want an epidemic, that is

all. In an orchard at Mortlake this year, carrying out that particular point, we had trees pruned and every dead branch cut out. That was the order. I did not see that every one was, but practically every one. We found a man could do twenty trees a day. You would pay that man about 5s. a day; we will accept 5s.; 5s. divided by 20 brings it to how much a tree?—8d. Does it pay or does it not? I leave you to settle in your own minds: is it worth while spending 8d. on a tree when it would keep down an epidemic? Is it worth 8d. or not?

MR. POWER: Might I ask a question? During the winter months is there any chance of getting at the spore—the scab spore I mean? If we spray in the winter is the spore in existence, and can it be attacked by Bordeaux mixture or anything else?

MR. MASSEE: No; I believe spores are not in existence, or at least they are at a discount altogether. What you have is the fungus present in the branch as it were—the roots of the fungus present in the dead shoots. The fungus produces fruit just about the time when the young shoots are developing, so that the only hope is in cutting off all diseased portions.

Afternoon Session, COLONEL LONG, M.P., in the Chair.

THE CHAIRMAN called upon Mr. Theobald to read his paper on

“WASHES USED AS INSECTICIDES AND ACARICIDES.”

MR. F. V. THEOBALD: I am afraid I am undertaking rather a difficult matter in opening the discussion on the spraying of fruit trees in connection with insect pests, for two reasons. The first, because I know little of the chemistry of the subject. The second, because I am not a wild enthusiast about the spraying of fruit trees. As you all know, there are a very great number of washes used for the purpose of destroying insects. Some of these washes act directly, some act indirectly, and from what I have seen a very large number of them do not act at all, so that we have to discriminate if we are going to wash our fruit trees as to what we shall use. As a matter of fact, we know very little about the spraying of trees. We have got to learn definite facts from growers as to what happens with the different washes, and it is only by summarizing the facts that we shall be able to get something really definite. Laboratory results are useful, but it is not until they have been checked by growers in many different parts, under varied circumstances, that their full value is attained.

The subject of the washing of fruit trees seems to me in its foundation to be very largely a chemical one, entailing entomological and mycological supervision. For that reason I do not feel I am at all competent to speak, and I must deal with the subject mainly from the point of view of the insects which the washes destroy. As an instance of the changes we may have to make the following is interesting. We have all been brought up to understand that there are two classes of washes, those for destroying biting insects and those that kill such sucking insects as the aphids and the *Psylla* by contact. We have been told that one can only be used for one particular purpose, the other for the other. Mr. Pickering tells us now, and I may say I partly agree with him, that it is

not necessary to use arsenical sprays ; that we can use emulsions, such as we use for the destruction of aphids and *Psylla*, for killing caterpillars. Whether the results that have been obtained in killing certain caterpillars will apply to all caterpillars we do, not know at present. This is for experimenters to find out ; but if they do, what then ? It means that we could use one wash which would destroy caterpillars and aphids at one time, so I think we must acknowledge we have as yet only touched the fringe of this subject ; therefore I would like to impress upon you very strongly that those who go in for the spraying of fruit trees should do so with a large amount of caution. They must not believe, because they see it in a particular advertisement, that a particular wash is going to destroy this, that, and the other insect. Try for yourselves and see what a particular wash will do, and if it will not do what is claimed, try something else, but do not throw huge sums of money away, as I am sure growers do, before they know what the wash which they are using is worth.

We see that emulsions may destroy some caterpillars, so that further experiment may show that we need to use only one wash. But we have got to consider from all points whether it is worth while to use the one wash to destroy the aphids and the caterpillar, saving of course time and money. I am sure that any form of mineral oil will do a certain amount of damage to trees. Now, in the case of certain arsenical washes little or no damage is done, so that one advantage must be weighed against another to see which of the washes it is best to use.

One thing I might suggest to growers is this : not to be led away by glowing accounts of certain preparations. I am not going to say that there are not patent washes which are good, but that there are others which claim to do impossible things. As Mr. Spencer Pickering has said, the more you see washes boomed, the less you find of value in them.

Still, one other point before I refer to certain of these washes. I may be wrong ; if so, you must contradict me. But I cannot help thinking that growers are spending too much in washing or spraying, for two reasons. First, they do not know quite what the washes are going to do ; secondly, because I have frequently seen in different parts of England people spending sums of money in washing their trees when there is absolutely nothing the matter with them. Surely, if a person is quite well he does not want to go to the doctor ; it is waste of money. Go to the doctor if you are ill, but not if you are perfectly well. Spraying is a costly process, and it should be cut down as low, as possible, and the trees treated with sprays only when there is something definitely the matter with them. People say you do it for prevention. I venture to challenge that ; there is no wash which we have at the present time which is a preventive. As far as insects are concerned, washes are remedial. You can destroy the insects, or you may be able to destroy the insects, but as a preventive with two possible exceptions we have no substance which will keep insects off. There is a possibility that quassia, for one, will ward off the attack of aphids *pro tem*. It is also possible that nicotine will ward off the advent of aphids and certain winged insects ; but beyond that there is nothing we can do to prevent the insect from taking up its abode and starting an attack on the trees, and neither of these two vegetable washes has any lasting effect.

Roughly speaking, we can divide the spraying for insects into two groups, winter and spring spraying. I should like very much if I could make growers think that there is a third, that is, spraying the trees, if necessary, in the autumn.

Why do we spray in the winter? It appears from what I can gather that the winter spraying is done for two purposes: the first is to cleanse the trees, and the second to destroy the eggs of insects; that is of course prevention. As to cleansing the trees, that is a very desirable object. Any dirty object wants cleansing to be brought into a more healthy condition, and winter washing for the cleansing of fruit trees is certainly an advisable, indeed a necessary, thing to do; but what is the good of winter washing to cleanse trees, as I too frequently see done, that are normally clean? It is a waste of money. You say it is done to destroy the eggs of insects. A gentleman this morning said that he sprayed his trees with Woburn wash, that is paraffin, caustic soda, and soft soap, and the *Psylla* eggs were destroyed. The eggs of the apple *Psylla*, I am sorry to say, so far as we can see generally, are not touched by the Woburn wash. There is no winter wash which will burn through and corrode the eggs of insects generally, such as, for instance, the winter moth or the lackey moth. I have known people to say, "We can destroy these eggs with a particular winter wash." Growers, I am sorry to say, gave up grease banding; they used winter washes, and the result has been that during the past summer we have seen their trees devoid of leaves. We must give up hope of destroying eggs of *Psylla* and most other insects until someone comes along who will produce something so caustic that it will burn through the shell of an egg (and I assure you it will have to be very caustic) without harming the tree. If you take the egg of an ordinary insect you have to soak it in caustic soda before the shell is destroyed; that is a process you will have to adopt with your trees before you corrode the eggs of the majority of insects. Possibly some other means of killing eggs will be found, but none is known at present.

The winter washes are therefore those you can use with a certain amount of benefit if used properly where they are wanted for cleansing the trees, and in so doing destroying the hibernating places of many insects, and so in that way doing a certain amount of good.

There are some, whose opinion we must certainly take account of, who say that certain washes with paraffin in them will destroy a certain proportion of insect eggs. Let us take a few examples. We will take, for instance, the eggs of the apple aphid—the little black eggs you get on the year's growth of wood. If you spray a tree with any winter wash containing paraffin or carbolic you will find, if you look at the eggs, that a very large number of them are shrunken up and destroyed. Then go to a tree that is not sprayed and you will find exactly the same thing. They are merely infertile eggs. And where people state that the eggs of insects are destroyed by winter washes, I am quite certain that the destruction which they think has taken place is merely the question of the infertility of the eggs; and if you examine the ova, no matter if of a hawk-moth or any of the smaller insects, you frequently find as much as 50 per cent. of them infertile; and I believe where the mistake is made in winter washes which are claimed to destroy a certain proportion of eggs is through not

taking into account the fact that a certain number of the eggs are normally infertile.

With regard generally to spraying for insects, if we are going to do any good, the point we have to aim at is the destruction of the young insects before they do damage. Many do not see the young winter-moth caterpillars. Why not? They are quite easily seen. If you, knowing the time the creatures appear, see them here and there or find there are great numbers, then set to work and spray with some fluid that will destroy them ; but do not go and spray a plantation because the caterpillars may come. They do not come ; they are there or not there ; and the spraying must be done to kill the creatures, not to try to prevent their coming. The spraying of fruit trees for these and other insects at the best can only do some good ; you will in any case do a great deal more good by trapping many insects and preventing them from laying their eggs.

Some of the chief washes I shall refer to very briefly. With the exception of tobacco and quassia, all the chemical washes that are used (whether purchased ready-mixed or made at home) do a certain amount of damage to trees. You may kill the creature doing the harm, but in doing so you will do a certain amount of harm to the trees, and if you go on year after year with these washes you give the tree a hard set-back that it will take many years to recover from. You want to cut the washing down as low as you possibly can on account of the damage which it does, on account of the cost, in many cases on account of the uncertainty of the action ; and lastly, I am quite sure, there is an amount of damage done by the process of washing, for the mere taking of the machines through the plantation does an enormous amount of harm, unless it is done very carefully ; so that altogether there are many disadvantages in spraying. Yet we must acknowledge that unless it is done judiciously fruit-growing will not properly flourish.

The winter washes, then, are primarily for one purpose, namely, cleansing trees. If you have a clean plantation it is advisable to keep it clean. If the trees become covered with green algæ, spray them with a winter wash. For cleansing trees I do not think it matters which one you use ; one is just as good as another. Assuming we have very old trees, such as are found in some of the cider orchards in the West of England, it will not do to spray the trees every now and again. You will have to winter wash perhaps for five, six, or seven years before you can remove all the foreign growth accumulated on the trees, and then, having cleansed them, you can fall back and treat them once every two or three years. But if you treat fruit trees with the strong caustic washes year after year I believe you do the trees as much harm as the foreign growths. Paraffin in particular, if used continuously, will produce very distinct appearances on the bark of the tree, and will do a great deal of harm. If you want merely to cleanse the trees use any of the washes that are advertised, or make one yourself, which is usually cheaper ; but if you see the trees are covered with mussel scale, or infested, we will say, with the apple sucker, or if the pear trees are damaged year by year with the pear-leaf blister mite, which attacks the fruit as well, then you must modify the form of winter wash you are going to use according to the pest you want to destroy. For instance, if you have the mussel scale I would suggest for

use either the caustic alkali wash, or a distinct improvement on the old caustic alkali wash, Mr. Pickering's Woburn wash, which is caustic soda combined with paraffin and soft soap.

The only difference between the old caustic soda wash and the Woburn wash is that the addition of the paraffin in the latter makes it work very much quicker, and is thus slightly better probably than the old caustic wash, working underneath the covering that protects the eggs of the mussel scale and rapidly destroying them. If you use the Woburn wash, or caustic wash, for the destruction of the eggs, we will say of the apple sucker, it will have no effect. Neither has it any effect even when used at double the usual strength. It is not because you do not hit all parts of the trees. It is because we have not anything sufficiently powerful at present to burn through the shell and reach the embryo inside. What I would suggest in the case of apple sucker is to leave the winter spraying as late as you possibly can, and not aim at destroying the egg, but aim at preventing the little apple sucker from making its exit from the egg-shell. This I have seen done in several cases with such good results that I am quite convinced that it is the best treatment. It is merely spraying the trees with lime and salt. You should get the lime on as thick as you can—whether salt is necessary or not is still in dispute. I think it is necessary. By spraying the trees with this lime and salt you form a covering over the egg-shell. The eggs of the little apple sucker are laid mostly in two places just where the lime and salt collect, and if you watch them you will find that the eggs hatch, but a very small per cent. of the young crawl away. You will never stamp out these creatures, but a very large proportion of them are unable to make their way through the particles of lime alive. They die long before they get into the apple buds and do the damage, so that if you have a bad attack of apple sucker you should winter-spray, not with paraffin, Woburn wash, or caustic wash, but with the lime-salt wash. The eggs are not killed; the insects are merely checked from escaping whilst in their delicate condition from out of the egg-shell, and so from getting into the buds. If you want to wash your pear trees that are attacked with the disease that has been spreading rapidly during last year, the pear-leaf blister mite, you should use winter wash again. The trees should be washed with the lime, sulphur, salt, and caustic soda wash, the so-called self-boiling wash (see p. 851). This wash has been found in America to destroy the young mite that produces this disease, and I have tried it myself on several trees with complete success. You will not only have cleansed your trees of this mite, but I believe I am right in saying that this wash has also a certain amount of fungicidal action, and in it you have a remedy against a pest which Woburn wash or lime and salt would have little effect upon. In winter washing fruit trees, therefore, you may have to decide what you want to destroy beyond the mere fact of keeping the tree in a clean and healthy condition, which is absolutely necessary.

I will now briefly refer to the arsenical washes. It may be that we shall be able to discard arsenical washes, but until we know more, and have found by experiments and have the opinion of a very much larger number of growers that the ordinary emulsion will destroy caterpillars,

we had better rely on the wash we know will do good. For the destruction of caterpillars of all kinds there are used what are called arsenical washes. The first used was Paris green, which often burnt up the foliage, and always did more or less damage. London purple was also used, but is not of very much account. Then came into use what is known as arsenate of lead. There are growers who have used arsenate of lead prepared on an old formula, which scientifically we are told is absolutely wrong, who found that their trees were damaged. Unless you get the formula right, the arsenate of lead may do a certain amount of damage (I have never known it, but I know one or two growers who state so). There are two forms in which arsenate of soda can be obtained, and in mixing the wash one has to find out exactly what form of arsenate of soda one is using. If we know that, well and good; mix one's own wash by all means; but when we can get this wash guaranteed made up ready for use it is as well to buy it. The wash is made by mixing arsenate of soda and acetate of lead and water; if we have the arsenate of soda in what is known as pure crystalline form, then we use $3\frac{1}{2}$ oz., and acetate of lead 7 oz. to every 10 gallons of water. If we have the arsenate of soda in what is known as the "dry" form, and used $3\frac{1}{2}$ oz., we should produce a wash that would cause a certain amount of scorching of leaves, so we have to reduce it to 2 oz. Arsenate of lead is fatal to all caterpillars. It has the advantage over Paris green that it is of a very strong adhesive nature, and at the same time it has greater killing power than Paris green or London purple; this is so well known now that it is scarcely necessary for me to refer to it. When should we use this arsenical wash? I believe in a large number of plantations it is necessary now and again. If we grease-band our fruit trees, which, we know, is a certain way of preventing the winter moth, which is far worse than any other caterpillar, we have only to spray with the arsenical washes when we get any particular pest present, that is, a pest not affected by grease banding such as the Tortrix moth and lackey moth. If we see these in the early stages, then we should spray; but do not go through all the plantations just because arsenical wash will kill caterpillars. Do not spray the plantations whether the caterpillars are there or not, because by so doing you are undoubtedly giving a set-back to the tree, because no tree will stand constant spraying, and you are doing no good if the caterpillars are not there. But if you have an attack of winter moth where you cannot grease-band, then spray the trees at the beginning of the attack when the little caterpillars are seen first of all in the early spring, before they are shut up in the leaves and the blossom trusses where you cannot get at them; then one spraying, if done thoroughly, should be quite sufficient. If you have in your plantation the codlin moth, which is not so destructive as formerly, trap the maggots by tying old manure sacking around the trees for the larvae to spin up under, and you will get rid of a large number. Then if you have the creature still persisting, a second application of this arsenical wash may be necessary soon after the blossom has fallen. But do not spray just because the creature may come, or I am afraid you will find a large proportion of the profits you hope to make will be gone in a chemical bill.

Another subject I wish to call your attention to is in connection with

the emulsions. Emulsions, you know, are used for the destruction of aphids, *Psylla*, and scale-insects. There are some hundreds of different formulæ which have been used. There are the paraffin emulsions in which paraffin oil has been mixed with soap—what are called soap emulsions. We use these very casually. We just spray the tree with paraffin emulsion to kill the aphids that is coming or is there; we do not think what paraffin we are using; there are any number of paraffins, some more fatal to the tree than others, some scorch up the trees and do infinitely more harm than insects can do; but there are paraffins you can use which do only a little damage. So, first of all, if we are going to use paraffin emulsion, which I should certainly advise no grower to use in the summer, because paraffin always damages the leaf to a certain extent—but if we have to use it, for instance, if we have a very bad combined attack of apple scale and apple sucker, where we have to do something drastic, then use only the best oils. Without discriminating particularly there are two very excellent oils. One is the Solar Distillate Oil, which has an advantage over others for several reasons; one is that it is carried by the railways without bother because of its very low flash point; another is that it contains something that is very fatal to the sucking-mouthed insects, and from what has been seen it has less effect on the foliage of the trees than other good oils. Another kind of oil which does comparatively little harm is known as White Rose Oil. I need not now give you the formulæ. Probably you have all got your own. You will always find that if soap emulsion is left a little while a certain amount of the paraffin separates from the soft soap. I do not think you can get anything like perfect emulsion with soap and paraffin. The metal emulsion that Mr. Pickering has discovered is very important and you will find it works excellently. De-emulsification does not take place with basic sulphates, as it does with soft soap, and the metal emulsions can be permanently emulsified, and have just as strong killing power on many aphides as where soft soap is used. There, again, we have an old idea upset. I have not the slightest doubt that soft soap alone is fatal to aphides, and yet you use one of these metal emulsions without soft soap, and get exactly the same results. If you use an emulsion with the soap you are liable to de-emulsification; the paraffin may come off too strong and do harm; the soft soap may come out as usual, and we know in the destruction of aphids it does a very large amount of good. If we have certain fungi, for instance the scab, we can make the metal emulsion with copper sulphate instead of with iron sulphate, which one would use if dealing only with insects. We can thus combine a fungicide, for instance for scab, and an insecticide, the copper sulphate acting as a fungicide and emulsifier of the paraffin at the same time. That I call a distinct advance, and from what has been claimed for it, and what I have seen on a small scale, this emulsion will destroy certain young caterpillars. Some time ago Mr. Bear, of Hailsham, found he could kill sawfly on the gooseberry with ordinary paraffin emulsion. Thus we may be able to simplify washing fruit trees to a very considerable extent, but I would emphasize the fact that this is only at present in an experimental stage. We have not had sufficient experiments to know whether caterpillars are destroyed wholesale, or to know whether it is only

in certain conditions of their life that emulsions affect them. Therefore let us still rely on arsenate of lead.

Lastly, I want to refer to the vegetable washes. All those washes which I have referred to containing metals and oils are injurious; no matter how well they are mixed or put on, they always do a certain amount of harm to the trees. We get just the reverse if we use a vegetable wash. If you use tobacco, or if you use quassia, you find no damage done to the trees. If you use quassia and soft soap for the destruction of the apple sucker, we will say in the trusses of blossom, you find it penetrates very much deeper into the trusses than where you use paraffin emulsion. If you use tobacco wash you will find it penetrates with even greater power than quassia, and at the same time you will find that the tobacco does no harm to the apple blossom, and, moreover, above this penetrating power it has, the same as quassia, a certain deterrent effect. It may not last for long, but even if you keep winged aphids off for a very little while it is doing some good. So that in tobacco we have an insecticide which does no harm, and is much more penetrating than emulsions, and a wash which may possibly do good in another way by keeping insects off the plant. There is a great drawback, the expense, which unfortunately has got to be considered; but I very much doubt if it is not better, where we have a bad attack of aphids year after year, to give it one good spray with tobacco wash than several with emulsions which may be cheap, because of the penetrative power of the tobacco. If you spray after rain, or a small amount of rain comes after spraying, you will find a wash like tobacco wash is enhanced. The wash is taken by the rain or moisture deep into the trusses where the suckers live, and there they are readily destroyed, not only by the contact of a small amount of soft soap, which I think you should always use with tobacco, but by the nicotine poison itself, which is just as fatal to insect life, as far as we know, as to animals higher in the scale of life.

Such are some of the insecticides and acaricides in use or being experimented with. It will be said they are very numerous, but one must not expect that the few scientists who have worked at this subject could do more for fruit growers in less than a quarter of a century than medicine has done for man in many hundreds of years.

Cleanliness of the trees must be aimed at, and any one of those winter washes referred to will cleanse them; but when we come to check any specific parasitic disease we must use what remedy is fitted for that purpose and not expect that any one will cure the lot. Moreover we must remember it is very easy to physic a man who is not ill, but it is waste of money, and the same may be said of our fruit trees. Too frequently one sees washing going on where there is nothing to destroy. Spraying can only do a certain amount of good, and the more cautiously growers go to work with this necessary adjunct of fruit growing, the more money they will keep in their pockets.

For even when spraying is necessary and does good we must still bear in mind that in destroying the disease the remedies too often weaken the plant. Keep up the health of the trees by cultivation and general attention. Destroy all old and dead wood, and the various diseases which necessitate our spraying will be lessened.

The Chairman then called upon Mr. Hammond for his paper.

“*SPRAYING AND SPRAYING MACHINERY.*”

MR. G. HAMMOND: The first remark I want to make is that the paper I am about to read has been prepared by my son. He knew that I was very busily engaged in public work; and on his own account he prepared this paper, as he had the details of all the experiments we had carried out. He had the advantage for a year or two of making himself familiar with mechanical engineering and he got a smattering of chemistry into the bargain. Therefore I am going to read a paper which I personally have not prepared, but which embodies the result of a large number of experiments extending over a considerable number of years.

The subject of spraying is so very many-sided and so complex, and at the same time so specialized, and furthermore there are so many persons more capable than I of speaking to you on their special phases of the subject, that I make no further apology to you for treating spraying this afternoon in a general way, and offering you a few remarks from a fruit grower's point of view.

In the first place, as a fruit grower I view the practice of spraying as a regrettable necessity—a necessity inasmuch as without it we have at present no remedy against many of our foes—and regrettable, as it is at once both costly and difficult to accomplish successfully on a large scale.

Fruit growers do not, as one of our friends well said at a meeting here, regard themselves as sent by Providence to be users of spray fluids for the makers' benefit and the support of the chemical industry; and the less they can use and yet keep their trees healthy, vigorous, and fruitful the better pleased they are.

If we could always keep our trees in thoroughly good growing condition, in good suitable soil and with proper relationship of branch and root, or briefly, in the condition which a fruit grower describes as being “in good heart,” we should have little, if any, need of spraying.

Everyone knows that if only one can keep one's physical health up to the mark the system will throw off all germs of disease, which find an easy entrance into the system of one who is run down or below par.

It is the same with our fruit trees. It is a well-known fact to all who have dealings with fruit trees, that it is the sickly and overcropped trees that are the worst affected with aphides; the strong and vigorous seem to be able to keep free of the pest. It passed almost into a proverb with the old-fashioned fruit hands, “No apples, no maggot,” as they used to call the winter moth caterpillar. It should therefore be our first aim to keep our trees in good growing condition by proper manuring, cultivation and pruning, so as to give them the best chance possible of resisting disease.

Yet though we may do all in our power for our fruit trees, and we may have very good soil and situation for them, yet the factor in the business which is beyond our control, viz. the climate, will often thwart our efforts and bring our trees under the influence of pests for which we must needs spray, or lose our crop, and perhaps nearly all our trees.

The enemies against which the fruit grower has to fight by spraying, or any other method available, may be divided into two classes: vegetable

and animal. In the first are included all the various fungi, from the strawberry mildew to the American gooseberry mildew, and from scab in apples and pears to black stripe in tomatoes; in the second all our animal enemies, from the huge stem-borer, the larva of the leopard moth, to the microscopic bud gall-mite of the black currant. I certainly think the former are harder to attack, as, being so closely allied to their hosts, many of the remedies one tries to apply, while being eminently successful in the killing of the parasite, kill the host too, which fruit growers do not exactly welcome.

Among the agents for destroying the various fungi, sulphur and its numerous chemical compounds take a high place.

Strawberry growers have long been familiar with the use of flowers of sulphur for mildew on their plants until now it has become a part of the routine of many farms to dust-spray all the strawberries once or twice, whether the mildew has made its appearance or not. Particularly is this the case where 'Sir Joseph Paxton' is much grown, this variety being specially subject to its attacks.

Within the last year or so we have had also brought to our notice another form of sulphur, or rather a chemical compound of sulphur, which is a most useful fungicide, viz. potassium sulphide, or liver of sulphur, which the Board of Agriculture recommend for gooseberry mildew, and which, if it will not kill the mildew, will certainly act as a preventive of infection, so long as it can be induced to remain on the bush and is not washed off; but being somewhat of a greasy nature it is very difficult to make it adhere to the twigs of gooseberry bushes. We use half an ounce to a gallon of water.

Our old friend sulphur turns up again as a constituent of another well-known fungicide as valuable as, if not more so than, the last, viz. copper sulphate—the active principle in that universal spray fluid, "Bordeaux mixture," whose uses extend from the potato to the vine and to all fruit trees.

It has undoubtedly worked wonders in combating the once dreaded potato disease, and in passing may I say that for the past two years we have used it as a dust spray with very good results, a great economy of labour and a total absence of damage to the haulms (which occurs when large breadths of very strong plants have to be sprayed with a machine in a farm cart).

We have applied it at the same rate per acre as we should have used in a liquid state, by means of a Vermorel Torpille machine, shut right in, the light powder being even then able to work through the grid fast enough. Bordeaux mixture has also been very successful in the vines in France, and it is at present, so far as I know, the only remedy for scab in apples.

My own experiments in this direction at present have not been very successful, but that either this or some other remedy must be persevered with is fully apparent to all who see the immense quantity of scabbed apples that have come on to our markets this year.

The drawback to this spray fluid is its somewhat slow action, and also the fact that you cannot be sure that it will not scorch the foliage and sometimes cause it to fall. The leaf of some varieties is so much more

tender than others that a strength which one will bear will cause the leaves of another to fall almost as in winter. To be thoroughly successful one must apply it in a mist-like spray at least three times during the period the apples are growing, and also know exactly the strength each variety will stand. In my own case I only gave one spraying, but quite 50 per cent. of the leaves fell off, and, though much improved, the apples are not even now entirely free from spot. The drawback also with this for the commercial fruit grower is that the operation must be done just when he is busy with his soft fruit, berries, currants, and strawberries, and when all his skilled hands, to whom he would entrust the work, are busy with the gangs of women, or packing, or some similar work.

It has become almost a necessity to train a special gang of men who can at any time be available for any spraying work that may crop up.

We have used a solution of copper sulphate in winter for *Botrytis* on gooseberry bushes, in conjunction with the liver of sulphur in summer; and although not able quite to stamp it out, yet we have substantially held it in check where formerly we had to grub up the bushes.

There are two fungi which sooner or later we shall have to tackle, perhaps by copper sulphate: one is the fungus causing the dying back of spurs or shoots on plum trees—the work of *Monilia*—and the other is the apple mildew, which causes the peculiar white shoots and tufts of leaves, alas! so often seen now, to which we find ‘Bismarck’ most subject. At present we have kept this in check by cutting back all infected pieces at the winter pruning, when they are easily seen, and, of course, destroying them by burning.

The *Monilia* is very hard to deal with, as it is only outside the bark, and so vulnerable, when the plums are in full bloom, the spore entering the bloom and working thence down the stalk into spur and shoot. At present it does not seem feasible to spray plums in full bloom with copper sulphate, deadly as it often is even to the leaf. The only remedy seems similar to the apple mildew cure just spoken of.

I need say little to you of the American gooseberry mildew, but leave it to the experts to fight out whether pruning, spraying, or grubbing, burning, tipping, or any other method, be the correct one for stamping out the dire disease. But let me say in passing that, whatever is finally ordered by the Board of Agriculture, I hope it will be something proved to be successful, so that a grower may not find, when he has loyally obeyed some Order, that what he has done has proved later to be of little or no avail.

There is one other class of enemy of fruit trees, belonging to the vegetable kingdom, which we need to fight, and that is the mosses and lichens which cover the limbs and branches of old trees, and which afford such a splendid hiding place for insects for the winter, as well as suitable positions for them to lay their eggs, and I daresay also fit soil for winter spores of fungi.

Fruit growers have long realized the advantage of ridding their trees of some of this encumbering rubbish, and long ago, before winter spraying was thought of, it had become good practice to scrape down and lime-wash the trunks and all large boughs of trees which were badly

overgrown with moss and lichens. It seems to me that, for the reason alone of destroying the harbouring places of insects and so on, winter spraying will be worth while, even though the effects of the various washes on the eggs of apple sucker, aphids, and the winter moth and similar pests may remain extremely problematical.

Last winter we experimented with most of the winter washes which were then on the market, but failed to find any that corroded any very large percentage of the eggs of the apple sucker. All of them made very good work of cleaning the mosses and lichens off the boughs, and to that extent we were successful. We did not try lime and salt wash, but we hear favourable accounts from friends who tried it, particularly when it was applied quite late in the spring.

We used some lime which had become air-slaked, and found that it stuck on the trees fairly well and cleansed them, and seemed to have cleared off some apple sucker, as they were cleaner than the next row, which was not done; it may be noted that this was done quite late in the winter.

What we consider our most favourable result was achieved by the use of hot lime-wash,* made by putting lime straight into water and applying quite hot, and in as thick a condition as possible. It was so hot as to make the delivery hose uncomfortable to hold, and, of course, burnt face and hands when one was so unfortunate as to get any on them.

Applied during the first fortnight in April, it stuck on the trees splendidly, and is not now entirely gone, a lot still adhering to the rough underside of the branches. As I said before, we considered the result very satisfactory, hardly any sucker being found on the trees, while a few which were left, among which some Narcissi are planted, and which, of course, it was impossible to do, were very badly infected.

The varieties were 'Mr. Gladstone,' 'Ecklinville,' 'Cox's Orange Pippin,' and 'Lord Derby.' Although this was so far successful for apple sucker, it was not wholly so for killing the winter spores of apple scab, there being some traces of it, though not a bad attack, on the 'Cox's Orange' and the 'Ecklinville.' It may be noted in passing that among all the winter washes we tried none seemed to have much effect on this scourge.

This hot lime wash was applied early in April, as, of course, there was no under crop of bush fruit in this particular orchard, otherwise it would have been impossible, and it seems to me that the tenderness and the liability to damage of the under fruit at the time when the eggs of all the various insects are most vulnerable makes the task of successful winter washing in a mixed plantation much harder than in an orchard where there is no such drawback.

This factor is constantly occurring in our work of spraying; for instance, when we wish to apply strong poison for the leaf-eating caterpillars very often there is a crop of gooseberries underneath, either just ready to pick or even being gathered, and one must either abandon the spraying or leave off gathering the berries for a week or two.

* About one and a-half bushel of lime is placed in a forty-gallon cask, filled up with water, allowed to boil for about ten minutes, then used. The cask is filled with water again, and by the time the first lot is used the second lot is ready.

Almost all the winter washes were successful in killing American blight, particularly those which had petroleum as one of their ingredients, providing sufficient force was applied to drive the wash into the crevices where the pest had made its abode.

The same may be said with regard to the mussel scale. It has been largely cleared off the trees; and again the petroleum compounds seem to have been most successful, which will not surprise many fruit growers, as paraffin has been found long ago to be useful applied with some clay as a paint for this pest.

Of course, no observation of this, other than microscopic, is of any use in the spring time, as to the results of spraying for mussel scale, for these scales are but the shell of the insect protecting the eggs, and it is only when the eggs hatch out, and new insects grow, that we can tell what good we have done; and even then we may congratulate ourselves on something we have never accomplished, since the scale has a parasitic enemy which devours the eggs sometimes to the extent of half their number. However, granting all this, looking at sprayed and unsprayed trees in the summer, we can tell easily that much good has been accomplished.

Leaving winter spraying, I think we can divide the insects we have to spray for in summer roughly into two classes—those we must kill by direct contact with the spray and those whose food we must poison, and so destroy. Among the former are included the different aphides, apple sucker, and red spider, and the latter comprise all the leaf-eating caterpillars and various beetles. For many years for the former class quassia and soft soap was universally recommended as the wash, and is even now very useful indeed; but it has been gradually superseded by paraffin emulsified with soft soap.

The need for emulsifying is, of course, abundantly clear to anyone who thinks of the impossibility of mixing paraffin and water together, and who also thinks of the damage the unmixed drops of paraffin will do to the leaves of the trees. The emulsion is made by churning certain quantities of paraffin and a solution of soft soap by means of a syringe or pump, and then diluting to the required strength. But even when the emulsion is ever so carefully made, on diluting it some of the paraffin is sure to separate.

This year we have used another emulsion, which has been very much more successful, in which the emulsifying agent has been iron sulphate, with which we never had the slightest trouble to keep the paraffin mixed up. For this, as for many other notable investigations, we are indebted to Mr. Spencer Pickering of Woburn. We found this wash quite successful in killing aphides where it could be got at them, and also red spider, but it was not so good at killing apple sucker, either on the wing or in the bunches of bloom. However, though this is a useful wash it has a drawback in that it leaves a rust, like a deposit of iron, on the leaves and fruit which might damage the fruit for sale unless soon washed off by heavy rain.

Though this wash was not fatal to apple sucker another of Mr. Pickering's remedies was absolutely so; in fact I have no hesitation in saying that wherever it touched any insect it was fatal to it. This was a

solution of tobacco made according to Mr. Pickering's formula ; * and not only was it successful against apple sucker, but equally so against aphides and caterpillars wherever it touched them. I have no hesitation in recommending this wash most strongly to growers for spring use, as I consider it the best one I have ever found, the only drawback being the price of tobacco ; and I consider that fruit growers should unite in strongly urging the Board of Agriculture to bring pressure on Parliament, or else apply that pressure direct themselves, to enable some scheme to be put forward to relieve such tobacco from the duty which is the bulk of its cost. For red spider on gooseberries where they are very tender and it is not considered advisable to use paraffin, liver of sulphur is a most excellent remedy ; but it must be remembered that for the destruction of this pest one spraying is not sufficient, for the reason that, if the weather is not bright, some of the insects may be in the clods and not up in the trees, and also that the hatching of the eggs extends over a rather long period, and if one batch is killed there may be in a few days another lot hatched out

So much for the foes we can kill in open fight. Several, like the weevils, work largely at night, or, like many of the caterpillars, are impossible to get at owing to leaf curling ; so that we must adopt another method for them, and that is, to poison their food. For this we require something which may be spread in a very thin deposit on all the leaves and which may be sufficiently strong to poison the insect without burning the leaves themselves. We find such a substance in the compounds of arsenic which, diluted with water and in this way finely divided, are some of them also not hurtful to trees.

London purple used to be largely used, but has been given up as very clumsy and dangerous, and now Paris green † and lead arsenate are the largely used washes—the former in cases in which it is desired soon to be washed off, as on trees over bush fruit, and the latter where it is desired to stick on as long as possible, and there is no danger of poisoning any under crop. For using both, the fruit grower cannot do better than obtain them in paste form, as is now possible, in which condition they may be readily mixed with cold water, reducing all risk of accidental poisoning of mixers and sprayers, and also ensuring the correct proportions. It has been proved by experiment now, however, that no lime is needed in using Paris green, and that the risk of burning the foliage is far greater with than without it.

These sprays, however, in contradistinction to those for aphides, sucker, and red spider, must not be applied in a powerful stream, but in a light mist-spray, otherwise much of the liquid runs off, thus defeating the desired end of a light deposit over all the leaves, and furthermore largely increasing the risk of burning the leaves. This needs a very good machine with a powerful pump, a fine dividing jet, and, last but not least, excellent judgment as to when to leave off spraying on a tree. Spraying is indeed a fine art, and this is one of its most difficult achievements.

Either of these two remedies if applied at the right time, and given favourable weather, will be found fatal to the various winter caterpillars

* 2 lb. tobacco to 10 gallons of water ; impossible for growers to prepare.

† 1 lb. to 200 or 250 gallons of water.

and other leaf-eating caterpillars, the grub of the codlin moth, and I have found them successful against the weevil that eats out the buds of the scions when trees have been grafted, only in this case it needs just a little growth on the scion for the poison to coat.

I have never sprayed for codling moth grub, but others have found lead arsenate an excellent remedy providing the right time is chosen, just as soon as the blossom has fallen, and for a week or two after. We have never been greatly troubled with insects on the gooseberry bushes, and have always been able to cope with any attack of caterpillars by the use of hellebore powder applied by means of a Torpille machine when the dew is on the trees.

With regard to the black currant mite we have tried the lime and sulphur remedy and have been to some extent successful, but we have found it burnt the fruit rather badly sometimes. For nurserymen on their young stock it is no doubt an excellent remedy, but rather dangerous for fruit growers. Personally I think the remedy will be found in spraying a greasy substance all over the trees in the spring, and so catching the mites.

I think this concludes all I have to say as to the various compositions to employ; but so far I have said nothing to you as to the time to use them, and therein lies the crux of the whole question as well as its difficulty. If when we wanted to spray it would always be calm and always remain fine half the difficulties of spraying would be removed; but when for days during winter spraying the wind blows from the same quarter with tempestuous fury, making it absolutely impossible to do more than one side of the tree, one realizes the irony of the writers of pamphlets of instructions who point out the necessity of wetting the whole surface of the tree. Frequently last winter we had as much as two to three acres of top trees sprayed on the east side before the wind turned sufficiently for the west side to be done.

Particularly is this the case where there are bush trees of any considerable size underneath, it then being next to impossible with the very strong caustic materials now used to spray up against the wind. Again think of the annoyance to the fruit grower when, after a long day spent in throwing pounds' worth of Paris green on to his trees, at evening a heavy storm comes on and washes all, or nearly all, of the valuable results of his labour off the trees.

As I said before, there is also the difficulty that, when it is just the proper time to spray for something for top fruit, it may be positively dangerous to some crop beneath, whether bush fruit or other crop. So what with climatic conditions and other causes, successful spraying is not by any means the easiest job. If the proprietor or his sons can manage to personally do the spraying work themselves, part of the battle is over; but where ordinary farm hands have to be trained in the use of the machines, and the various quantities of chemicals to mix, it needs constant vigilance on somebody's part to give it any chance of being successful and not too exorbitantly dear. How annoying to come upon the spraying gang standing idle watching one of their number pulling the pump to pieces, perhaps a couple of hours' job from stop to start again; or owing

to wrong mixing to find the trees burnt, or else the mixture used at a strength insufficient to kill, and so much valuable labour lost.

The pumps used should be as far as possible unlikely to go wrong, and, should they do so, as simple as possible to dismount and repair. To this end ball valves ought to be used in preference to clacks or mushroom valves. It should be possible to get at the mouth of the suction hose to clean it, and this of course should be covered with close mesh wire gauze. The pump should have an air chamber for maintaining continuous pressure, by which it ought to be possible to get from 60 to 100 lb. a square inch. Whatever form the plunger takes it should, if packed, be easily renewed as the wearing with lime and caustic washes is considerable, and sometimes the pump will give out quite suddenly from this cause. All taps used should be well ground in, and have large passage ways, or they are liable to choke with heavy washes. As to the form of nozzle it is impossible to speak with any certainty, as there are so many different forms, all equally good, some for one job, and some for another. I have found those the best in which a spiral twist is given to the liquid by some device or another before it comes to the final opening, which can be large or small as desired. This spiral twist given to the liquid gives better results than if it were forced direct through the same aperture.

Whatever form of jet is used, and whatever pump forces the liquid, it must be possible to get a fine mist-spray with a good pressure behind it. Washing as one understands it from hop washing is of very little, if any, use in fruit-tree spraying, and a good light spray with power behind it has a more penetrating effect, and but little of the liquid is lost, compared with the loss when there is a copious flow with little pressure behind it.

Now as to the form of pump to be used, and the way it is to be mounted.

It seems to me that except for small places and small trees the knapsack machine is not big enough, and is next to useless save for a tree here and there. It does not carry enough, and it is not possible to throw the liquid far enough when one has to direct the spray and the pump too. Fancy using a two-gallon knapsack on a tree that requires a 40-stave ladder to pick it. It is like attempting to put out a big fire with a lady's scent-spray. There is not only the drawback of want of power, but owing to carrying so little they require filling so frequently in long lands necessitating as many carriers of fluid as pumpers to keep the latter even moderately busy when the trees are of any size. Personally I think in large gardens 40 gallons is the lowest capacity that can be used with profit. In large grass orchards, or those where there is no undercrop, a holder up to 100 gallons can be used, but particular care must be taken to keep the liquid in such a large machine well agitated. This is a most important point in spraying, as without thoroughly effective agitation the spray fluid is likely to be very weak at one time and over-strong at another as the active component either rises or sinks in the water.

All spray fluids are of course diluted to a safe strength with water, and all, no matter what kind they be, have a tendency to separate when in the machine, either like the emulsions to rise and form an oily curd

on the surface, or, like Paris green and such compounds, to sink to the bottom. It is therefore an *absolute necessity* that whatever spraying machine is used it shall contain some device or other which shall effectually agitate and mix the liquid whenever pumping is taking place. This may be accomplished in many ways, the handiest, in the case of a pump mounted on the top of the container, being a rod with a plunger at the end going to the bottom at the end of the stroke, and rising of course on the up-stroke of the pump. It should be accomplished if possible by utilizing the movement of the stroke of the pumps so as not to complicate matters too much. There are some American machines made which include a handle with bevel gears driving a shaft upright in the barrel having attached to the bottom arms which revolve when the handle is turned, and so churn up the liquid; but this seems to me to involve either extra labour or very complicated work on the part of the pumper, and I think it is not desirable.

I had an idea at one time that the desired end might be accomplished by turning a sort of pass jet from the main delivery into the bottom of the tank, but I found that to sufficiently agitate the contents so much liquid must pass as to run away with the power from the jets. One would almost think that jolting on an unsprung trolley over the clods would stir up the mixture, but I am afraid this is not the case; it appears to have rather the contrary effect with some mineral compounds, causing them to settle to the bottom. However I will not labour the point further, but everyone who goes in for spraying must realize that it is only to court absolute failure to try to work with a machine which makes no provision for this necessity.

With regard to the delivery pipe, we use indiarubber hose to within a very short distance of the nozzle, having very short delivery pipes, finding the shorter ones much more handy to use than long. I think the best thing to buy is a medium quality three-ply tubing. Of course the cheapest is dear at any price, but on the other hand we find the very best hoses built to stand high pressure are too hard and are liable to crack—that at least has been our experience—and that a more pliable quality not quite so strong is more useful in the long run.

We have quite given up the use of wire for hose fastening, using the very handy brass clips with screws and nuts which are fixed and unfixed in a few moments and never blow off under the greatest pressure.

It may be asked, how do you reach the tops of the trees with such short pipes and long length of hose? To overcome this we use long bamboos, such as are used for curtain poles, about 12 feet long, and into the top we fix one portion of a brass joint for chimney and drain cleaning rods; the other portion with about four or five inches of wood affixed is bound to the delivery pipe close up to the jet. One has then only just to screw the bamboo with its top into the latter portion and you have a light twelve-foot delivery pipe nice and comfortable to hold from its large size, but which can be attached in a few seconds enabling the hose to be coiled up and put on the machine when returning for a fresh supply of liquid.

Anyone who has done much spraying work will, I am sure, appreciate the handiness of this. There is nothing more awkward than 20 feet of hose with 6 feet of delivery pipe, and perhaps a stick tied to it, all on the

top of a machine, catching in nearly every tree as it goes up and down the rows.

Now for the mounting of the machine. Providing you can get a pump that can be adapted to it, I think there is nothing more handy for a container than a paraffin barrel. The pump can be mounted either on the top or on the side as desired. If it is wished to put the tackle in a cart, mounting on the end is best, involving less labour in fixing in the cart, all that will be required being a few light stay irons screwed into the bottom of the cart and bolted to the barrel. For going in amongst bush fruit mounting on the side is better, involving less risk of overturning at the ends, and being much easier to work in all ways. For summer work we mount this on a small long trolley carrying the wheels well in front and behind the barrel, thus enabling them to be of narrow gauge. The two front wheels are mounted on a little sweep or lock allowing them to turn right round underneath the machine; thus the latter can be twisted round almost anywhere. We have just two eyes or shacks, both front and back, in which to hook the chain trace used for the pony, and we find by this rig we can travel up and down most of our berries and red currants, even in the fruiting season, with very little damage. In winter time it is best to mount the barrel on a couple of runners like a sleigh, as the small iron wheels are inclined to cut in deeply in the wet soil, especially if the machine has to travel two or three times in the same valley.

I fear there has been a lot of personal element in this paper, but one can only speak in a case like this from experience of what one has seen and done oneself. What I have given you is what little we have learned during the last fifteen years' experience of spraying, and as such I trust you will pardon what may seem gross egotism.

I have said little to you of the various quantities for making the spray fluids for two reasons: first, that there are gentlemen here who are specialists in that line; and secondly, that we have found it best in the long run to buy a good many of the complicated washes and emulsions already mixed, it only being generally necessary to dilute with a certain quantity of water. We endeavour to deal with firms of chemical manufacturers whom we can fully trust, whose machinery as well as their skill enables them to make up these things far better than we can; and furthermore makes it more possible to leave a gang of sprayers alone for five minutes, secure in the knowledge that they have only the child's work of putting so many pints of mixture in so many gallons of water when they require a fresh lot of spray fluid. I have mentioned no name of any firm in this paper, but all growers should find out for themselves firms in whom reliance can be placed, and whose word can be believed, that when they say a certain wash will kill a certain thing the grower may know it has been proved effectual for it; or that when they say that such and such a machine will stand reasonable use, it will not break down the first day and every succeeding one.

I am very glad this Conference has been started, and I only hope that much good may be accomplished, that we may all spend what money we spend on spraying to greater profit in the future than we have been able to do in the past.

DISCUSSION.

THE CHAIRMAN: I am sure the meeting will feel that we have had most interesting papers read to us; and now comes the time for discussion. I will ask any gentleman who wishes to give us his experience, or make any remark, or ask any question, to come up to this end of the room.

MR. FRED MOORE (Glasnevin): I should just like to make a few remarks upon the papers we have heard read this morning and this afternoon. I think there is one thing that will strike everyone, and that is, the diametrically opposed nature of the views which have been put before us. How are we to find our way and hammer out a reasonable solution from the very different advice given to us? Mr. Massee has insisted that we do not spray enough; he says that we must spray more—in winter, spring, and summer. Professor Theobald says that we are not to spray in winter and decries the winter spraying. Which of them is right? There is one thing I think which they have discounted and that is the intelligence of the cultivator. You will find if you get into contact with the cultivator that he is not the simpleton he is supposed to be, especially the cultivator who has got to make his living out of the business. Leave it to him to decide whether spraying is wanted or not; and if the scientists would set themselves together, as was suggested most practically by Mr. Collinge this morning, and devise an efficient and cheap wash to meet the exigencies of the occasion, I think that would do good on both sides. But I do strongly advise cultivators not to give up their spraying merely because they are told to do so, but to satisfy themselves first whether spraying is necessary or not; and I would strongly urge them not to give up winter spraying, which is, I believe, an essential thing for the cultivation of fruit trees. And I would further advise cultivators to consider very carefully before they accept the statement that constant spraying with the existing sprays in the winter is deleterious to the health of the trees. I would go further than that, and emphatically state from experience that it is beneficial to the health of the trees. The trees that are regularly sprayed in winter do not require nearly the amount of spraying they otherwise would do; and also I would say you get a healthier and better condition of your tree. Professor Theobald has said that we do not physic ourselves until we are ill. Why not put the converse and say that all decent people wash themselves and their surroundings?

We have got two points which have been leading us all astray. In getting at our applications we have neglected two things, the climatic and the physical conditions, where the experiments have been made. You will find in Cornwall and in Devonshire and other warm counties that a very different class of conditions prevails from that in the Midland counties. Many people in London have been complaining of the heat and want of rain. Last week we had much rain in Dublin; we had a wet night on Wednesday and continuous fog; and we have the greatest fungous growth on grass in the district, greater than I have ever seen previously to my knowledge. Are those conditions of climate going to

be treated in the same way as a warm dry climate? If you have a wet climate and do not spray in winter, take my advice and do not start fruit growing; you will not succeed. I wish to say that I hope one of the results of this Conference will be that some attempt may be made at getting a standardization of these washes. That is what we want. We do not merely want to know of such and such a wash, but we want to know what the ingredients are which should go into the wash—what we should write to the chemist for. I hold very strongly that we ought to prepare our own washes and sprays from our own materials whenever we can do so. I was once sheltering in a public-house during a very heavy snow-storm in the North of Ireland: it was Fair day, and they were dispensing drinks freely. The landlord had a very potent brand of whisky and I said that I would try it; but he said as an aside, "I don't advise you to." I said, "What is it?" and he replied, "I doubt if its own maker knows, I don't. I only know that it is the cheapest I can get." And that is what has been going on with regard to these washes. We experiment with washes which we do not know anything about the composition of, and we ought to have a standardization of the materials in it. Are we going to stand up and say that such and such a wash is insufficient; it is of no use, don't try it? Prepare it yourselves with standardized materials which you know are right, and then report on it. Then some faith may be had in the results you have met with. I think a lot of conflicting views arise from the fact that we do not know what we are using; we only know its name, but we do not know the standard of it.

Under the Department of Agriculture for Ireland we have been making extensive experiments in inducing the small farmer to grow fruit. Some of them have been at it a little before on some of the farms and fields where these orchards are which belong to the Department. The Department has planted an acre, which is under the control of an inspector, where spraying must be done. I can only assure you that the farmer has reaped an advantage in many cases. In some cases you can see the unsprayed tree in his orchard that is older, and the sprayed tree that is younger; and the difference will leave no doubt in your mind as to whether spraying is desirable or not—you will never have two opinions about it. Not only is spraying necessary, but I believe continuity of spraying is necessary; and I think that the immunity from pests of all sorts, in direct opposition to some views we have heard, in well-worked orchards, is due to a reasonable continuity of spraying. I do not mean taking up the line that you should spray your trees often, but spray them regularly, with a good compound, and you will never regret the results of it. That is, I believe, the most essential and important point in fruit growing.

One word more as regards American gooseberry mildew. There was a laugh when that matter was first mentioned; but it is no laughing matter; it is the most serious pest that has attacked fruit during the memory of anyone here; the rapidity with which it will devastate the country side is beyond belief. There has been a question asked as to what the remedy for it is. Several suggested that there was a remedy. There is a remedy so far as we can find out from experiment, and the

only one—burn the bushes. That is the only remedy there is as far as we can at present ascertain.

One point more. Of the specimens that have been sent up to the Department of Agriculture in Ireland this year to be reported on as to what kind of disease it was which was on the trees, 90 per cent. of them have been admittedly injured by using bad washes.

Question: I wish to ask one question of Professor Theobald. Is there any remedy for the apple weevil? This year I have suffered more from that pest than from any other; it crawls about the trees and lays its eggs in the young fruit when the blossom is gone. I want to know if Professor Theobald thinks there is any use in leaving grease-bands on the trees till the blossom is out—say till the middle of May—and whether he thinks any of the apple weevil will crawl up the trees in the summer.

Mr. THEOBALD:—I do not think grease-bands have the least effect on the apple weevil. We know that you may possibly catch one or two on the grease-band by chance; but, being a winged creature, the grease-band has little or no effect. As to the remedy for it, I am afraid I cannot say that one seems to be known at present. Mr. Bear noticed that where emulsion with lime and salt wash was used it certainly checked it to some extent; but still a lot of weevil was left. However, beyond this, shaking weevils off on to cloths is the only thing that growers have found of great benefit or effect at all.

Mr. COLLINGE: With regard to what Professor Theobald was saying about the apple-blossom weevil I have at present a paper in the press detailing a number of experiments in grease-banding for the apple-blossom weevil where the grease-band was entirely ineffective. No weevils were found on the band. It is commonly said that the female weevil does not fly; it certainly does not creep up the stems of the trees. My advice to fruit growers, so far as the apple-blossom weevil is concerned, would be to re-echo the words of the gentleman who has just sat down and say, Keep your orchards clean, and then I don't think you will see much of the apple-blossom weevil.

Question: I should like to ask for a substitute for soft soap in paraffin emulsion; I did not quite catch it.

Mr. THEOBALD: Either iron sulphate or copper sulphate. Whether the copper sulphate is worth using I do not know; but the iron sulphate in any case is.

Mr. C. O. WALTERS: I wish to make a remark with regard to caustic wash. From my experience the foliage does seem to have been very much better altogether after using it; so I think the caustic washing must be beneficial; it destroys all sorts of hiding places for insects; even if it does not kill the eggs, it certainly destroys the resting places in great numbers.

A certain firm (I will not mention the name) sent me in the spring a quart of a specially prepared wash for killing caterpillars. I used some, as I thought I would experiment with it before I used the whole lot or ordered any more. I prepared it according to the instructions, and I found half a dozen caterpillars. I gave them a good strong solution and put them carefully on the grass. Next morning I examined the caterpillars and found them just as lively as they were the night before; it had not the slightest effect on them. Then I used the solution of

double strength, according to the directions ; but it had exactly the same result—it hadn't killed one of them. So I did not give myself the trouble to spray with it in order to kill the caterpillars. It was proved to be quite useless. But I am certainly in favour of the caustic washing.

MR. BAKER : There is one essential fact which this Conference has, I think, emphasized, and that is that fungicides are on the whole preventive ; whereas insecticides are, on the whole, remedial. Therein lies the essential difference between Mr. Massee's recommendations this morning, in which he says spray and spray frequently, and Professor Theobald's recommendations this afternoon, when he says spray only when the pest is there. Most of us know that a fungicide will go far to prevent mildew where it is used ; but it is of little use trying to prevent insect attacks by spraying.

The one thing which I would like to emphasize is this, that, as a result of several years of experiments and close observation, every year adds to my conviction that what we ought to aim at doing is, not so much finding a remedy as to get a class of plants which have a good constitution, or, at any rate, to cultivate them in such a way, and to such extent, that they are resistant to the attacks of pests. I could take you to a place close to my own home where there are a number of shrubs, and some of those shrubs have been mildewed badly, others not at all. I interlaced adjacent branches of different shrubs of the same species, and some are only slightly diseased. The same thing applies to other trees. You may go into an orchard and see one tree badly affected, especially in the case of fungi, while the next is not anything like so much affected. There must be some reason for this. Is it a constitutional weakness on the part of the one which has so easily fallen a victim ; and, if it is, does it not behove the cultivator to endeavour to raise a class of plants which will have constitutional vigour to enable them to resist the disease ? If it is, as I believe it is, a question, to a very large extent, of deficiency in some ingredients of plant food, or of something there which is harmful, surely we ought to aim at getting something which will make the plant as much as possible immune against disease. I think that what one ought to aim at doing, as far as possible, is to cultivate plants to make them as far as possible resistant ; and, secondly, more especially to endeavour to make our plants healthy by means of culture, right manuring, and so on.

THE SECRETARY : Before anyone else gives us his views I wish to say that Colonel Long, who has been so very kind, and to whom we are deeply grateful, is obliged to go to perform his duties in another place. Therefore I am sure you will wish to accord him a hearty vote of thanks for coming here this afternoon and presiding for us. (Applause.)

THE CHAIRMAN : Ladies and Gentlemen—Thank you very much for the kind and hearty vote. I assure you that it has been a great pleasure to me to come here ; and I must say that both this morning, although I was late, and this afternoon I have listened with most intense interest to matters which are very much open to debate, and which most of you have evidently in your hearts, because it strikes at your pocket.

MR. FRYER (West Hampstead) : Professor Theobald has said that in using soft-soap emulsions the paraffin is liable to separate, and he

recommends sulphate of iron. That, I believe, is a very good thing ; but just recently Mr. Pickering, with my assistance, has discovered that there is an oil from which you can make a spray which does not cause that separation. Nor do you get separation from the use of caustic soda. He is calling this soap the Woburn soap for paraffin emulsion ; and there is no doubt that it would be very valuable if used for this purpose ; it is quite a new discovery.

Mr. PERCY BUNYARD : I think we are all agreed there is not any insecticide which is so penetrating as nicotine. It is not only extremely penetrating, but it is easy to use ; there is absolutely no clogging of the machinery. What we want is to get nicotine down to about half the price it is at present. The present price of nicotine is about 10s. or 12s. a pound, and if we could get it down to about half that price I believe that it would be by far the cheapest insecticide, as well as the most effective.

Mr. THEOBALD : There are only two more things to which I should like to refer. I am afraid that Mr. Moore took rather a different view of the paper which I read from the meaning I meant to convey to the Conference. I am not at all saying that we should not go in for winter spraying ; I say that we *should* go in for winter spraying. But what I maintain is, that it is waste of money to spray trees that are clean. When you see that they are getting dirty you should start winter spraying ; but if you are going on to spray, spray, spray all your trees every winter, spring, and summer, I want to know where the fruit grower is going to get a profit out of his work. By all means do it if you wish to put money into the hands of the chemical manufacturers instead of into your own pockets. If you are going to spray six or ten times a year, where are you going to get a profit ?

Mr. FRED MOORE : One winter spraying and nothing else ?

Mr. THEOBALD : Do you destroy the caterpillars and everything else, and do you maintain that the winter spraying destroys the eggs of the insects ?

Mr. FRED MOORE : No, I do not say that ; but I maintain that for insuring the health of the trees the winter spraying is the only spraying which should not be neglected.

Mr. THEOBALD : For instance, the apple aphis which flies to the tree ; and the apple-blossom weevil will fly on to the tree. What is the good of winter washing for these ?

Mr. FRED MOORE : I did not claim it as a remedy against insects ; I quite agree that it does not kill insects' eggs—I have proved that by experiment—but I do say that it puts a tree into a healthy condition, and helps to keep it in a healthy condition, so that it is able to resist those attacks infinitely better than the unsprayed tree can—a point of view which the reader of the paper after you also emphasized.

Mr. THEOBALD : Certainly spray them to keep them clean, but do not waste money. I maintain that if a tree is clean it is waste of money to spray it.

Mr. FRED MOORE : I maintain that you cannot keep it healthy without spraying.

Mr. THEOBALD : The only other point I should like to mention is as regards the nicotine. I do not know that any experiments were made

in the destruction of caterpillars. So far I have not found nicotine is good for caterpillars: it may destroy them, but certainly its killing power is not very high—it is only suitable for creatures like *Psylla*.

Mr. PERCY BUNYARD: There is no difficulty whatever in killing caterpillars with nicotine.

Mr. THEOBALD: I'm afraid I have never come across any preparation that will do so. Probably I shall come across it at some time. The only other point is in connection with red spider. Is it not true that the red spider hatches out as early as February?

Mr. HAMMOND: Yes, that is something like it. The red spider is one of the most erratic of the pests with which we have to deal. After an hour or two of bright sunshine you find the boughs covered with them; and after an hour or two of dull weather you cannot find one. Their hatching extends over a good many weeks.

Question: Will you tell us how you use liver of sulphur for killing red spider—do you mix it with water?

Mr. HAMMOND: 4 lb. to 100 gallons—it is almost universal knowledge.

THE SECRETARY: We are very much obliged to both Mr. Theobald and Mr. Hammond for the very valuable papers they have read; but I need not propose a vote of thanks, because they have seen our thanks in the interest we have all taken in them. I only hope that this Conference may be suggestive of some good to fruit growers; and, if we are to renew it in another year, that you may all come and tell us that we have no insects and no fungus left.

APPENDIX A.

PRINCIPAL WASHES USED AS SPRAYS AGAINST INSECTS AND MITES.

By Mr. F. V. THEOBALD, M.A.

CAUSTIC OR WINTER WASHES.

OF these we have Caustic Alkali Wash, the Woburn Winter Washes, the Lime and Salt Wash, and the Oregon Wash.

CAUSTIC ALKALI WASH.

Formula:

Caustic soda (98 per cent.)	.	.	.	2-2½ lb.
Water	.	.	.	10 gallons.

Uses.—For cleaning old mossy and rough-barked trees in winter and killing mussel-scale ova. Must be used only on dormant wood. The best time is February or March. Caustic potash is as good as the caustic soda, but is dearer, and hence is not now recommended. Pickering has shown that the carbonate of potash is of no value, and thus only waste of money, yet previous results have shown that it improved the wash. The addition of paraffin to the caustic wash has been found to

make it much more effectual ; and this wash, known as the Woburn wash, is made as follows :—

WOBURN WINTER WASH (A) (*non-fungicidal*).

(1) *Formula :*

Soft soap	. . . . .	$\frac{1}{2}$ lb.
Paraffin	. . . . .	5 pints.
Caustic soda	. . . . .	2 lb.
Water	. . . . .	9 $\frac{1}{2}$ gallons.

Preparation.—Dissolve the soap in warm water, churn the paraffin into it, and then shake in the caustic soda. This soap emulsion does not seem as good in winter as the metal emulsion, made with iron sulphate.

(2) *Formula :*

Iron sulphate	. . . . .	$\frac{1}{2}$ lb.
Lime	. . . . .	$\frac{1}{4}$ lb.
Caustic soda	. . . . .	2 lb.
Paraffin	. . . . .	5 pints.
Water	. . . . .	10 gallons.

Preparation.—Dissolve the iron sulphate in nine gallons of water ; slake the lime in a little water and then add more, so as to make it into milk of lime ; then run the milk of lime into the dissolved iron sulphate through a fine sieve, to strain off all grit ; then churn the paraffin into the iron sulphate and lime, and finally add the caustic soda.

Uses.—This wash acts as a cleanser of the trees, removing moss, lichens, algæ, &c. It also kills the delicate ova of the mussel scale. The caustic soda does just the same, but is not so rapid in action on the delicate ova of the mussel scale.

Time of Application.—Any time between November and February. This may be advised as a wash in old orchards, or where mussel scale and oyster shell bark louse are troublesome.

WOBURN WINTER WASH (B) (*fungicidal*).

It is doubtful whether winter fungicidal washes pay for the cost of material, but if considered necessary the following is the best :—

Formula :

Copper sulphate	. . . . .	1 $\frac{1}{2}$ lb.
Lime—quick	. . . . .	$\frac{1}{2}$ lb.
Paraffin	. . . . .	5 pints.
Caustic soda	. . . . .	2 lb.
Water	. . . . .	10 gallons.

Preparation.—Dissolve the copper sulphate in eight or nine gallons of water, slake the lime in water, and add to the dissolved copper sulphate, running it in through a fine sieve, to strain off all grit ; then add the paraffin and churn, and then add the caustic soda and water to bring the whole up to ten gallons.

Uses.—This wash cleanses trees of moss and lichens: it also is fungicidal, and is of value where apple scab occurs on the wood. The mussel scale ova are destroyed, as well as oyster-shell bark lice. The copper sulphate is not necessary except where apple scab occurs on wood, and thus should have its place taken by the cheaper iron sulphate if the scab is not present.

Time of Application.—Any time between November and February.

LIME AND SALT WASH.

This wash has come into use mainly on account of its tending more than anything else to prevent the damage done by the apple-sucker.

Formulae :

(1) Lime	.	.	.	.	.	.	1-1½ cwt.
Salt	.	.	.	.	.	.	30-40 lb.
Water	.	.	.	.	.	.	100 gallons.
(2) Lime	.	.	.	.	.	.	1-1½ cwt.
Salt	.	.	.	.	.	.	30-40 lb.
Waterglass	.	.	.	.	.	.	5 lb.
Water	.	.	.	.	.	.	100 gallons.
(3) Lime	.	.	.	.	.	.	1-1½ cwt.
Salt	.	.	.	.	.	.	30 lb.
Washing soda	.	.	.	.	.	.	3 lb.
Water	.	.	.	.	.	.	100 gallons.

Preparation.—Get fresh lime of the best possible quality (flake lime is found to be the best) and let it slake gradually, and then mix it with the water in which the salt has been dissolved, and strain through a fine sieve or sacking into another receptacle. Waterglass has been added to make the wash hold better on the trees, but it is not essential, and does not always seem to have sufficient effect to make the extra cost worth while.

If it or the soda is added it should be put in the strained wash, having been previously dissolved in water.

Uses.—For the prevention of hatching of the eggs of apple-sucker, plum aphid, and mussel scale, and for cleansing the trees of moss, lichens, &c.

Time of Application.—The end of February until the beginning of April. Spraying should cease as soon as the buds open.

LIME-SULPHUR-SODA WASH, OR OREGON WASH.

Formula :

Lime	.	.	.	.	.	.	3 lb.
Sulphur	.	.	.	.	.	.	3 lb.
Salt	.	.	.	.	.	.	3 lb.
Caustic soda	.	.	.	.	.	.	1 lb.
Water	.	.	.	.	.	.	10 gallons.

Preparation.—Mix the soda and lime together, and slake with hot water in which the sulphur has been incorporated; then stir and add

the salt, let this boil for some time and then add the full quantity of water.

Uses.—For destroying the pear leaf blister mite and as a scalecide.

Application.—On dormant wood only. In case of the pear spraying must cease as soon as the bud scales are fully opened. A heavy spraying is best.

This is better than the Californian wash given below :—

Quicklime	.	.	.	.	.	.	6 lb.
Sulphur	.	.	.	.	.	.	3 lb.
Salt	.	.	.	.	.	.	3 lb.
Water	.	.	.	.	.	.	10 gallons.

Mix 1, 2, and 3 with enough water to slake the lime. While still hot add more water and boil for forty-five minutes, then bring up to ten gallons.

ARSENICAL WASHES FOR MANDIBULATE INSECTS.

ARSENICAL WASHES.

- A. Arsenate of Lead.
- B. Paris Green.
- C. Calcium Arsenate.
- D. London Purple.
- E. Arsenite of Soda.

A. ARSENATE OF LEAD.

Formulae :

- | | | | | | | |
|--|---|---|---|---|---|-------------|
| (1) Arsenate of soda (pure or crystalline) | . | . | . | . | . | 3½ oz. |
| Acetate of lead | . | . | . | . | . | 7 oz. |
| Water | . | . | . | . | . | 10 gallons. |
| (2) Arsenate of soda (dry) | . | . | . | . | . | 2 oz. |
| Acetate of lead | . | . | . | . | . | 7 oz. |
| Water | . | . | . | . | . | 10 gallons. |

Preparation.—Dissolve both together in the water and well stir, and then add 1 lb. of treacle.

This insecticide may be obtained as a paste called Swift's Arsenate of Lead Paste.

Uses.—It destroys all biting insects, such as caterpillars and beetles ; especially beneficial against winter moth, codling moth, lackey moth, currant moth, gooseberry and nut sawflies, slugworm, &c.

This wash may be mixed with Bordeaux mixture and also paraffin or paranaph.

Time of Application.—The first spraying should take place as soon as the buds shows signs of bursting, and again as soon as the blossom has fallen. Now and again a third spraying may be necessary, to kill gold-tail and vapourer moth caterpillars, &c. It should be used as a fine spray, and the spraying should cease as soon as the leaves are seen to be dripping.

B. PARIS GREEN.

Formula :

- (1) Powder
 Paris green powder 1 oz.
 Water 10 gallons.
- (2) Blundell's paste (copper oxide 81 per cent.,
 arsenic trioxide 59 per cent., acetic 10 per
 cent.)
 Blundell's paste 1 oz.
 Water 10 gallons.

Preparation.—Mix either powder or paste with the water, and keep in constant movement, to prevent the Paris green sinking to the bottom of the water. The writer has always found the addition of lime at the rate of 4 oz. to the 10 gallons of benefit in stopping scorching, but Strawson says this is not necessary.

For delicate-leaved trees, such as peach, nectarine, and apricot, $\frac{3}{4}$ oz. to 10 gallons is sufficient.

Uses.—For destroying all biting insects, such as caterpillars and beetles.

Time of Application.—The same as for Arsenate of Lead. It is necessary that this wash should be put on as a very fine spray, owing to the scorching effect it has on foliage. It must never be used when the trees are in blossom.

C. CALCIUM ARSENATE.

Formula and Preparation.—Add one part milk of lime to every one part of crystalline sodium arsenate, dissolved in 400–500 parts of water.

Or :

- Arsenate of soda (crystalline) $3\frac{1}{2}$ oz.
 Quicklime $3\frac{1}{2}$ oz.
 Water 10 gallons.

The lime in the form of a milk is added to the dissolved arsenate.

Uses, &c.—The same as the previous arsenical washes.

D. LONDON PURPLE.

Formula :

- London purple 1 oz.
 Lime 1 oz.
 Water 10 gallons.

Uses, &c.—The same as the previous arsenical washes.

E. ARSENITE OF SODA.

Formula :

- White arsenic 2 lb.
 Sal. soda 8 lb.
 Water 2 gallons.

Preparation.—Boil until the arsenic is dissolved (about 15 minutes) and keep up to 2 gallons by adding water. Use 1 pint of this to 40 gallons of water.

Uses.—Same as above.

Arsenates are preferred to arsenites now.

General Notes on Arsenical Washes.—Of the five mentioned there is no doubt that Arsenate of Lead is best to use, because it is more easily mixed and holds in suspension longer than Paris Green, &c., and the burning of the foliage is almost entirely absent if properly mixed; it has also more adhesive properties. The paste form known as Swift's Paste has been found satisfactory in many parts of the world, and is best to use, unless great care is taken in making the home-made wash. Fruit trees should not be sprayed with the arsenical washes when in flower, as the bees are so readily poisoned, and they should not be sprayed for at least four weeks before the fruit is gathered. This is a point to be remembered when gooseberries and currants are growing beneath apple and plum.

These arsenical washes should be put on in as fine a spray as possible.

Animals may be kept in the grass orchards when the trees are sprayed as long as they cannot get at the actual wash. All receptacles in which the spray has been mixed should be cleaned and kept away from stock.

We must remember that these washes, especially when concentrated, are deadly poisons.

Arsenate of Lead is usually used in conjunction with Bordeaux mixture, and it also emulsifies paraffin, so that we can combine a fungicide and an insecticide for mandibulate and haustellate insects in one.

PARAFFIN SOAP EMULSIONS, OR CONTACT WASHES, FOR HAUSTELLATE INSECTS.

PARAFFIN EMULSIONS.

For winter application these washes may be used very strong, but for summer use they must be much diluted.

Except in bad attacks of scale insects they cannot be recommended as summer washes, nor can paraffin in any form. In spring paraffin emulsion may be used for red spider on gooseberries in the form given under Paraffin Jelly, but paraffin is always best applied before the leaves are showing, as even the finest oils do harm to vegetation.

Through the work of Mr. Spencer Pickering we now know more of these matters, and growers will do well to use the oil recommended by him known as Solar Distillate.

The usual form of paraffin emulsion is soap emulsion, but Mr. Pickering has recently shown that metal emulsions are superior as emulsions. Probably for scale insects the metal emulsions will soon supersede the soap emulsions, but for aphides they are not likely to do so, as the soap is the most active killing agent and is alone sufficient to destroy them.

SOAP EMULSIONS.

The emulsions I have used have been the following :—

For Winter Use only.

Formula :

(1) Paraffin (Tea Rose)	10 gallons.
Soft soap	15 lb.
Water	100 gallons.

(2) Paraffin (Tea Rose)	7 gallons.
Soap	12 lb.
Water	100 gallons.

For Summer Use.

(8) Paraffin	8 gallons.
Soft soap	12 lb.
Water	100 gallons.

Preparation.—The soap is dissolved in boiling water, and when still very hot, better still just boiling, the paraffin is added, and the whole churned by means of a force pump into a creamy mass. About ten gallons of water are sufficient to do this, and then the remaining water is added gradually.

The Solar Distillate Oil is undoubtedly the best to use, but excellent results have been obtained with Tea Rose.

Uses.—For the destruction of mussel scale eggs in the winter, oyster shell bark louse, and brown currant scale.

PARAFFIN JELLY.

Formula :

Paraffin	5 gallons.
Soft soap	8 lb.

Preparation.—Boil the soft soap and the paraffin together, and when boiling add one pint of cold water and stir well. This becomes a jelly on cooling ; add 10 lb. of this jelly to every 40 gallons of water.

Uses.—For the destruction of red spider on gooseberry and for killing brown scale on gooseberry and currant.

Time of Application.—In February if only for scale, in March if for red spider or for both.

PARAFFIN-METAL EMULSIONS.

For Summer Use.

De-emulsification never takes place with basic sulphates, as it does with soap.

Formula :

A. Copper sulphate	10 oz.
Lime water	8 gallons 3 pints.
Paraffin (Solar distillate)	24 oz.
Water	10 gallons.

Preparation.—Dissolve the copper sulphate in water and add the lime water or lime, and then churn in the oil, and bring up to 10 gallons with water.

or B. Iron sulphate	10 oz.
Lime (as a milk)	5 oz.
Paraffin (Solar distillate)	16–24 oz.
Water, up to	10 gallons.

It is necessary here to precipitate the iron, which can be ascertained by testing the clear liquid (before the paraffin is added) with potassium ferrocyanide; if a Prussian blue coloration is seen more lime is required.

Uses.—The first acts both as a fungicide and insecticide, the second as an insecticide only. Aphides, leaf-hoppers, and thrips are destroyed by this wash, and, according to Mr. Spencer Pickering, caterpillars are also killed by it.

Time of Application.—Just when the buds are bursting, and again when the blossom has fallen. Arsenate of Lead may be mixed with either of these washes.

Apply as a fine spray.

QUASSIA AND SOAP WASH.

Formula :

Quassia chips	10 gallons.
Soft soap	$\frac{1}{2}$ lb.
Water	10 gallons.

Preparation.—Boil the quassia chips in water for a couple of hours, then dissolve the soap in warm water, if possible, and mix the strained off quassia extract with the soap. Another method of preparation consists of boiling the quassia with half the soap and half the water; strain off the liquid, and boil the residue for one hour with the rest of the soap and water, and mix the two decoctions and make up to 10 gallons of water.

Uses.—For the destruction of all aphides and Psylla.

Time of Application.—As soon as the aphides hatch from their eggs or appear on the plants, if migrants.

TOBACCO WASH.

Formulae :

(1) Tobacco powder	8 lb.
Soft soap	$\frac{1}{2}$ lb.
Water	10 gallons.
(2) Tobacco leaf	$\frac{1}{2}$ lb.
Soap	$\frac{1}{2}$ lb.
Water	10 gallons.

Preparation.—Infuse the tobacco powder or leaf in water for about six hours, then strain off and press the tobacco and infuse again. Add the tobacco extract to the dissolved soft soap and water.

Uses.—An excellent insecticide for aphids, Psylla, cuckoo-spit insects, leaf hoppers, and thrips. It is also to some extent a repellent or insectifuge, and for this purpose may be sprayed over unopened or opened blossom, with the hope that it may prevent egg-laying by pear midge and apple sawfly. No results, however, have yet been conclusively obtained in this matter. It may be procured in the form of a powder-tobacco, which has been denatured in bond, at 20s. per cwt., or if the leaf is used any of the coarser tobaccos will do at about 8s. 6d. per lb. If powder is employed a much greater quantity is necessary than if the leaf, but the former, being so much cheaper, is

recommended. Messrs. Voss & Co. send out a tobacco extract, 1 lb. of which equals 8 lb. of tobacco, and makes 10 gallons of wash.

Time of Application.—For aphid and apple-sucker in early spring, best just after the buds have burst. For thrips, &c., in May and June. It may be used at any time, even on opened blossom.

ACARICIDES FOR RED SPIDER.

LIVER OF SULPHUR (Potassium sulphide).

Formula :

Potassium sulphide	3-5 oz.
Water	10 gallons.

Preparation.—Dissolve the substance in water.

Uses.—This is not only a fungicide, but it is also an acaricide, and may be used on gooseberries for red spider. It may be mixed with paraffin. Its action is somewhat uncertain as an acaricide, however, and its place is being taken by paraffin jelly.

LIVER OF SULPHUR AND PARAFFIN.

Formula :

Iron sulphate	2 oz.
Quicklime.	1 oz.
Paraffin	16 oz. (liquid.)
Potassium sulphide	4-6 oz.
Water, up to	10 gallons.

Preparation.—Dissolve the iron sulphate in 6 to 7 pints of water, and add to this the quicklime, made into a milk, passing it through a fine sieve, to strain off any grit, and then emulsify the above with 16 liquid ounces of paraffin; then dissolve the potassium sulphide in 9 gallons of water and pour the emulsion into it and well mix.

Uses.—This wash may be used in winter on bushes and trees attacked by scale, or in late winter on bushes attacked by red spider.

If employed in spring half the quantity of potassium sulphide should be used.

APPENDIX B.

PRINCIPAL SPRAYS FOR USE AGAINST FUNGI.

Compiled by Mr. F. J. CHITTENDEN, F.L.S.

A. FOR WINTER USE ON DORMANT TREES ONLY.

I. Iron Sulphate Solution.

Iron sulphate (green vitriol or copperas) . .	2 lb.
Water	5 gallons.

II. Acid Iron Sulphate.

Iron sulphate	25 lb.
Strong sulphuric acid	1 pint.
Water	50 gallons.

III. Copper Sulphate Solution.

Copper sulphate (blue-stone)*	1 lb.
Water	15-25 gallons.

Preparation.—I. Iron sulphate readily dissolves in water.

II. Put the iron sulphate in a *wooden* (not metal) vessel and pour upon it the sulphuric acid; add the water by degrees, commencing as soon as the acid has been poured on.

III. Copper sulphate is best dissolved by placing in a loosely woven bag and suspending in water in a *wooden* vessel.

Uses.—These sprays are for use in winter only, and are to be used on trees which have been attacked by a fungus in order to destroy resting spores. The iron sulphate solutions are very disagreeable to use owing to the readiness with which they burn clothing, &c. The weaker copper solution should be used in spraying peach trees and others with tender shoots. The copper sulphate may be used in combination with paraffin and caustic soda (Woburn Winter Wash (B) see page 850).

B. COPPER SPRAYS.

I. Bordeaux Mixture (Normal Solution).

Copper sulphate	6 lb.
Quicklime	4 lb.
Water	40 gallons.

II. Bordeaux Mixture (Woburn Recipe).

Copper sulphate	10 oz.
Limewater	8½ gallons.
Water to make up to	10 gallons.

III. Soda-Bordeaux Mixture.

Copper sulphate	4 lb.
Caustic soda	1 lb. 4 oz.
Water	50 gallons.

IV. Ammoniacal Copper Carbonate.

Copper carbonate	5 oz.
Strong ammonia ('880).	3 pints.
Water	45 gallons.

Preparation.—I. Dissolve the copper sulphate in the manner described above in about 20 gallons of water in a wooden vessel. Slake the quicklime in another vessel, adding water gradually at first until the lime has crumbled to a powder, then in greater quantity, so as to form a milk. When cold, and not before, strain this through a piece of coarse cloth, adding it to the copper sulphate solution, constantly stirring meanwhile. The addition of the milk of lime should be stopped when, on adding a drop or two of a solution of potassium ferrocyanide to a little of the mixture in a white saucer, no red colour is produced. The mixture is not fit for use until the addition of a few drops of ferrocyanide of potassium produces no red colour, and it is unwise to add more lime than is required

* The copper sulphate employed in all these sprays should be of 98 per cent. purity.

to act on all the copper. Care should be taken that the copper sulphate and lime are of the best quality. Many failures are undoubtedly due to the use of bad, impure materials. The mixture should be of a blue colour when properly made and it should be made afresh as required.

II. The copper sulphate is dissolved in about half a gallon of water, $8\frac{1}{2}$ gallons of clear limewater is run into this solution, and sufficient water added to make up to 10 gallons. The limewater is made by putting about $\frac{1}{2}$ lb. of quicklime freshly slaked in the way described above into a tub with 12 to 15 gallons of water, stirring once or twice and then allowing to settle. The mixture must be tested as in (I) with potassium ferrocyanide, and if necessary more limewater added until no red coloration is given by that test.

III. Dissolve the copper sulphate in 10 gallons of water and the caustic soda in about 15 gallons. Pour the soda solution slowly into the copper sulphate solution, stir and test the mixture frequently with red litmus. Cease adding soda solution when the red litmus turns blue. The exact amount of soda solution required will vary according to the quality of the caustic soda used.

IV. Make the copper carbonate into a thin paste with water, add the ammonia, which should produce a clear solution of a deep blue colour. Dilute with water to 45 gallons.

Uses.—I. Bordeaux mixture is without doubt the best fungicide so far discovered. It is to be used on foliage with the object of preventing the hyphæ of the fungus gaining an entrance into the tissues of the leaf, and the aim should be to apply it in such a manner as to cover both surfaces, and especially the under surface, of the leaf with a thin covering as completely as possible. It is useful against scab of apples and pears, brown-rot of plums and other fruits, &c.

The solution of the strength recommended is often unfortunately too strong, as it is liable to burn young foliage. For spraying young foliage and for some plants at all times the mixture should be diluted with water to about half the strength given in the recipe.

II. This, or a similar modification of Bordeaux mixture has been in use in Italy, where it has given good results, for many years. It is used for the same purposes as the normal Bordeaux mixture, and the following advantages are claimed for it:—

"This solution is as efficient as that [Bordeaux mixture] made in the ordinary way, though the latter contains two-and-a-half times as much copper sulphate. It . . . is much finer in texture, and, therefore, less liable to settle to the bottom of the liquid; it also contains no particles of solid lime, . . . and, further, it exhibits its fungicidal action at once after it is applied, instead of necessitating a certain time to elapse before such action begins, as in the case of the ordinary mixture."*

III. This solution has been used in America, but little in England. It has been spoken highly of in dealing with certain fungoid diseases of the vine, and has the advantage that caustic soda is often more easily procured than good quicklime. It is a solution certainly worth experimenting with, and may probably be used in the same way as Bordeaux mixture.

* S. Pickering and F. V. Theobald, *Fruit Trees and their Enemies*, p. 28.

IV. The fungicidal action of ammoniacal copper carbonate is not so great as that of Bordeaux mixture, but it has the advantage that it may be used with impunity upon delicate foliage, such as that of peaches, which Bordeaux mixture even in the diluted form would burn. It has proved effective in dealing with the "shot-hole" fungus of peaches and with peach "curl" (in the latter case combined with pruning).

C. POTASSIUM SULPHIDE SOLUTION.

Potassium sulphide (liver of sulphur)	. . .	1 oz.
Water	. . . . .	8 gallons.

Preparation.—The potassium sulphide readily dissolves in water, but impurities are sometimes present which do not dissolve. Fresh material should be used as the sulphide alters in contact with the air.

Use.—The solution is useful against many mildews and other fungi, and should be used as strong as the foliage will bear. The quantities given above are safe for almost any foliage, but some will bear a stronger solution. The solution discolours white paint.

D. SELF-BOILED LIME-SULPHUR SPRAY.

Flowers of sulphur.	. . . . .	10 lb.
Quicklime	. . . . .	15 lb.
Water	. . . . .	50 gallons.

Preparation.—The lime is placed in a wooden barrel, and two or three gallons of boiling water poured over it. The sulphur is immediately added, together with three gallons of hot water. Cover the vessel with a cloth, and the mixture will boil by the heat of the slaking lime for twenty minutes. Stir occasionally to prevent burning. When the boiling ceases add enough water to make fifty gallons. Strain through a sieve, with about twenty meshes to the inch, to take out the larger particles of lime, but work all the sulphur through.

Use.—This solution has recently been used with excellent results in America as a fungicide, and it is worthy of extended trial. Even peach foliage is uninjured by it, and it has proved useful in checking various fungus diseases of apples, including scab and leaf-spot.*

* See U.S.A. Dep. Agr., Circ. 1; April 1908.

GARDEN DESIGN—COMPARATIVE, HISTORICAL,
AND ETHICAL.—I.

By THOMAS H. MAWSON, Hon. A.R.I.B.A.

[Lecture delivered September 1, 1908.]

THIS first lecture of the series is to be regarded as a preface to the two which follow. It takes us back to the beginning of gardening, and defines certain broad ethical principles to be gathered from great examples of ancient art, to be accepted or rejected by my readers; using the broad attested manifestations to illustrate my theory, or, at times, inserting them as a darker background for the purpose of securing strong contrasts, and refusing, for the present at any rate, to be drawn into the vortex of debatable details.

I have, I believe wisely, abandoned my primary intention of laying in a separate lecture a foundation for my subject by a swift narration of the history of garden design, and then building upon this basis a second lecture, entitled "The Ethics of Garden Design." As I gathered my materials together, the historical proffered, at least in my apprentice hands, to be a dry compilation of facts, a show of mummies, calculated to weary the most patient. In dealing with ancient records one is confronted with Voltaire's apothegm: "I can always write the best history when I am not hampered with facts." There is often some disagreement between reliable authorities, and the student has to discriminate between the actual facts and the imagination of the historian.

It is incompatible with the instincts of everyone who has to tend or design a garden to be content with mere surface appearances; he must get at the roots of things. I have therefore abandoned the former cut-and-dried method and desire to blend the ethical and the historical, making the one branch keep pace with the other, giving the ethical the precedence, and allowing the historical to be illustrative.

It is a principle of mine, in studying anything and everything in the shape of visual effects, whether of a constructive character or artistic, that you must, along with your study, take into your reckoning the age, the racial instincts, the religion, the pervading customs and environment generally of the designers or producers of the work you are considering, and the prevalent line of thought, political, social, and religious, that obtained at the respective periods; because in matters artistic nothing is absolute, everything is relative. This is an axiom which, although often before expressed in many different ways, I would at the outset reiterate and fix upon the minds of every student, but especially those who pursue Art, because it has its bearing upon everything visual, constructively applied with beauty as the end in view. For example, most objects of man's handiwork are not beautiful, and are not meant to be considered in the abstract; they are only so relatively, according to their use and association; a bicycle or a motor-car has no beauty, and yet obtains our

approval and pleases our minds according as it expresses its fitness for the purpose of speed or luxurious travelling ; in other words, things commend themselves according as they express their function. In the same way a statue of Apollo or Athlete wins our admiration by its show of muscular strength and energy. Let an artist colour a space with bright yellows, then surround it with dark sombre greys and heavy blues, and it takes a hue like lambent gold by contrast ; but change the surround from the dull dark shades to bright reds and warm hues, and then it is the only one colour in common. So I say that every historic phase of design, whether of gardens or in other departments of Art, must be judged in its setting, its date, and environment. It would be unfair and absurd to divorce them, and this is sufficient reason to warrant my change of plan.

I am further assured that this method is opportune by the fact that a change is apparent throughout all former methods of instruction, and our mode of imparting information alike in all subjects. In the kindred art of architecture the old antiquary conservator of ancient monuments who restored on the pedantic rule of his collected and dry compilations of what is here, and what there, is being replaced by men who not only tack together the poor decrepit old body, but who can exhibit the living soul of the old in the new, and can enthuse the new with the poetic life of the old.

In connection with gardens and gardening, knowledge of trees and plants, that which formerly was instilled by methods of rote and cram is now conveyed by the pleasanter method of demonstrating the effects by visual objects, as traceable from the causes and the laws which have led up to the ultimate preferment ; hence, nature lore and nature study are prominent, and such sciences as botany, chemistry, classification, and so forth, which formerly were run at an inordinate pace without any knowledge in the student of where he was steering, are now disciplined and made to subserve the object in view.

Garden design is one of those pursuits of studied freedom where observation counts for more than knowledge, where broad atmospheric effects count for more than detail, and yet it owes a heavy debt to the ages and to history. The practitioner is like the man who is a householder bringing forth out of his treasury things new and old ; he gathers the harvest which other men have sowed in the older work, and also avails himself of every new purpose which is approved and workable. On rare occasions his indebtedness to the old takes the shape of grafting it on to the new, and representing the ideas under a more attractive guise in accord with his " previous knowledge," his particular coloured spectacles or telescopes, his specialized and awakened faculties, without which he ought never to travel from home, and without which the study of history, however specialized, is but a dry rehearsal of facts ; to some men, who are ever in danger of losing the essential amidst details, it is even injurious. Our indebtedness mostly arises from pondering over the way obstacles were overcome and how each respective traditional phase of design, each with its own set of congregated features, combined to make the whole at least appropriate if not always beautiful.

In order to maintain the broad lines stated above, I am not inclined to draw any hard and fast line between those gardens of which we have extant remains, and those of which we only have decipherable records to guide us, such as the Egyptian, Babylonian, and Grecian gardens. Breadth does not preclude thoroughness because it does not magnify details. It is in accord with principles of thoroughness that I have refrained from taking the different periods of garden history at a rush.

It has been said that the real object of education is not so much to give a certain amount of knowledge, as to awaken faculties which slumber within us, and to open people's minds to broader uses and their eyes to more extended vision; and that one book, learnt by a man who knows how to assimilate it thoroughly, is worth more than libraries as usually read. It is not therefore imperative that much should be taught, but that what is taught should be taught philosophically, profoundly, and lovingly. Once let a person learn to read a single history thus, and he has the key to all histories, he is better educated by the comparison than he would be by all the histories of the world as commonly taught. This is most true in respect to the study of garden design.

If I wished to read the history, or get at the current of prevailing thought of any people, a few representative examples of their architecture and their gardens would be quite sufficient index for me to secure a fairly accurate survey of their ideals and of their inherited traditions, and this way has the additional advantage of being an interesting avenue of approach—a great desideratum with the garden designer.

Suppose we wish to get an idea of an early Egyptian garden, we are compelled to avail ourselves of this relative principle in order to judge of the merits it possesses and its suitability to its environments. We cannot transport it to another clime and judge it side by side with other gardens. Here all gardens must be wholly artificial productions; of this our knowledge assures us by one glance at the configuration of that domain of fierce sunlight and no rain, which otherwise must remain an expanse of sterile sand were it not for the irrigation devised, and the annual mud deposit of the lordly Nile. As we enter we are impressed, as well as soothed and charmed, in this inset enclosure of cool water, foliage, and fruitfulness. I gather that the Egyptian gardens were not by any means small, but they must have appeared so in comparison with the scale of the surround of hugeness: for truly, if the ancient Egyptians excelled in anything, it was in the way they impressed the senses with a feeling of awe at beholding the appalling vastness displayed in their severely monumental architecture.

I was once made conscious, by the sight of a picture with the simple title "1812," of this awe-inspiring sense of vastness, wherein the Egyptian type of civilization revelled, and of its superiority in this respect over everything modern that aspires to the grand. Napoleon and his staff, mounted on their chargers, were gazing intently at the mighty immobile Sphinx amidst the speaking silence of league upon league of desert sand. Before the Emperor's eyes was the presentment of a majestic awe which made all his attempts but a flash in the pan, and his

splendour only a theatrical display. Judging from the account of the making of the model for the large statue entitled "Vital Energy," which occupied so many years of the life of the late G. F. Watts, one could fearlessly defy the combined skill of the modern world to produce, or to imitate, anything so hugely skilful as the Sphinx with its inscrutable benignity of countenance. Mr. Watts' statue is child's play in comparison with the Sphinx, since the former depended upon the pronounced lines of swinging arms, and the prancing legs of the horse and so forth, which is as nothing compared with the feat of having to make everything depend upon the expression of a countenance.

The Egyptian gardens were a worthy adjunct to the accompanying impressiveness of temples and palaces, with their huge sculptured fronts, which in their decay and ruin make their beholders look like Liliputians—not that hugeness is much of a feat in itself, else would the ugly 24-storey skyscrapers of New York be impressive. The gardens wore more or less throughout the same air of dignity which was none the less pronounced on account of their needfully artificial character. Doubtless everything therein wore an aspect of tranquillity, and they appeared, on account of their freshness, like welcome oases in the surrounding Sahara. Here at least was the cool splash of water essential to all the regal freshness of odour, bloom, and fruitfulness around, benign upon the bosom of Father Nile in the midst of all the surrounding austerities. Here at least was one genial product of this martial race of universal exporters of war machines—the heavy armaments of that day—whence King Solomon sent for his chariots and horses.

From the very nature of their construction those gardens were the luxury alone of the rich, of kings, and of the powerful. They were not on this account small, although always formal, judging from the hieroglyphic plan representations of them, and must throughout have worn an artificial aspect, as do the Dutch gardens of modern days, where again everything is imported; parallels where it would be unjust to quarrel with artificiality, or the made-to-please aspect of a garden. Not for a moment can it be conceived that in the Egyptian garden there was anything puerile, of the baby-house stamp, which we sometimes get in Dutch gardens, or in the white spar rockeries and so forth of modern gardens; they were a Titanic race far too serious to descend to that level.

Unquestionably the formal character of a garden interspersed and flanked with effective masonry is more imposing and spectacular than the freer landscape aspect of a garden. I do not say it is more beautiful; but what I mean to say is that the former ministers to the pride and ostentation of man, the latter is more on the lines of the acceptance and arrangement of beautiful things as they come from Nature's hands. Herein man accepts his subordinate and primitive place of "dressing it, pruning it, and keeping it in order." This was not the prime object with these ancient gardeners, the Egyptians and the Babylonians, who ruled by the stern imperious might of their own will, the very mention of whose name is reminiscent of iron bondage. Even if they had dwelt in a land productive of natural beauty, everything must appear in a halo of magnificence and ostentation, along with the array of massive temples, palaces, and towers surrounding.

The aspect which we consider the primary one in a garden, namely, the appeal to the senses of rest and delight amidst beauty, they considered secondary and a means to an end. That end, as I see it, was that *they* should gain honour and be extolled behind their gardens and their intricate designs as well as by their powerful works. Although their hieroglyphic records would at first sight make it appear, to those unaccustomed to garden plans, that they were very stiff, yet a person initiated in the various modes of garden design can well see that there was a singular witchery in these effective contrasts of broad lights and shadow-play (a lost art to-day is the science of shadows), the combinations of walls, masonry, massive and columned gateways, interspersed with the fine perspective effect which canals of water always yield; these perspectives further enhanced by the bordering avenues of stately date palms and similar erect growing trees, which, so far as I can gather from the representations, were of the Cypress family, avenues of which produce such a sensation of weirdness in the Italian gardens. With the capacious rest-house as the central object—its heavy overhanging roof, flat of course—all enclosed, embedded almost, within the precincts and the privacy of an imposing though not forbidding embattled wall (for walls are welcome objects of shade in the East and not half so forbidding as with us), and the canals sweeping up to its steps fronting the deep shadowy recesses behind the flanking columns, the pleasing interchange of foliage and abundantly productive fruit-trees and water, the fruitful vines clambering over trellis and pergolas and resting thereon their loads of luscious fruit, one can imagine these prototypes of the gardens of Italy, offshoots from the lagoons, alluring us with a dreamy web as of a lotus-eater's afternoon, such as is experienced by visitors to the gardens surrounding the ancient Moorish temples and cathedrals of Spain. There was a fair variety of plants, nuts and spices, each tree uniting to produce the desired effect of subduing the mind. With all who are susceptible to such influences, who possess the power of introspection, of turning inward with a sense of pleasure, there is an indescribable potent charm emanating from every plant and flower which finds an answering note within, and perhaps is more subtly diffused by grateful odours and the aroma of soft spice-laden breezes than by gorgeous colours and resplendent forms. The ancient Egyptians knew this and used it in the aggregate combine of features to enhance *their* glory. Some trees and plants even were acclaimed as sacred, and as such were only permitted to be grown by sanction of the priests.

Now I say, after a careful survey of the Egyptian ideal of civilization that this air of mysticism and awe within their gardens was intended, and accords with the peculiar mysticism of their national beliefs as represented by the oft-recurring Sphinx, the goddess with the body of a lion and the face of a young woman, generally accepted as the representative of a being who sat by the wayside and propounded mysterious riddles to the passers-by, whom she devoured on the spot if they could not answer her; it accords with their ideals as represented by Neith, the beauteous heroine of the Egyptians, whose many supposed attributes cannot be given in any short summarized statement; Thoth, the recording angel of judgement; Pasht, symbolic of the moon, with the

cat-like head; the Greater Ptah and the ugly yet seriously impressive beetle-headed monster known as the Lower Ptah, representative of labour, who is always represented as having had his eyes put out, cunningly suggestive of the frequently too limited outlook of those absorbed in manual labour.

Wise-hearted men are not like the blinded devotees of the Lower Ptah, who cannot see how and where their individual craft (the particular craft under question at the moment being the delightful one of designing gardens) fits into the scheme of all things wise and beautiful. I want to show shortly that the Divine scheme of design in a garden is altogether different from man's ideal, and the man who works with the Divine ideal in view is not likely to be captivated by the Egyptian or the Babylonian ideal, with all their august reverential awe, their mystic glamour and witchery.

I do not wish to allure anyone into even a study of these obsolete deities, but I think I have said enough to prove that the ancient Egyptians had, without the slightest shadow of a doubt, a powerful systematized and wonderfully impressive potentiality as a race. You cannot sever the people, their handiworks, and their religion, which is perhaps the deepest and most serious impulse in man. From a Christian standpoint I quite agree that we can brush away these old heathen deities with a sweep of the hand; yet we must admit their cunningness, their power upon the mind, and their skill. As Ruskin has pointed out, there are very few draughtsmen that can even render on paper the expression of the Egyptian deities; there are many who can draw them with laborious faithfulness, but they are unable to depict their subtlety of expression. We moderns, in most things we take up, trend towards superficiality; we are painfully microscopic, but we often seem to lose the essential amidst the detail, and, missing that, we miss all.

Now let us for a moment try to transport ourselves to the precincts of one of these Egyptian gardens in its setting of temples and palaces; the Nile gliding without, with its flotilla of slave-propelled ships and boats, occasionally an emblazoned sail peering above the bounding parapet wall; within the weird perspective of its lagoons or water-aisles fringed with whispering reeds, flags and lotus, and hemmed in with tall palms, their clean erect trunks like mighty columns topped with the living design of waving plumes and fruit; the eerie cypresses relieved by the richer hues of fruit and flowers, the vines aforesaid; the deep shadowy recesses relieved by the bright sunny lights, all so well planned, now blended and shimmering in the cool water; here and there a statue of some god; throughout the hush of stillness approaching to reverence; not a trace or reminder of anything sere or approaching decay; all has been removed by the ever active slaves whose lithe figures glide about in their spare oriental adornments. Truly this is a place of witchery and surprise, a place where you are enveloped in glamour; you are spell-bound, and this is exactly where the ancient Egyptian has triumphed; for according as a designer could thus captivate his client, so his skill; for they had garden designers in those days. Records are extant of one named Nekbt, who about 1500 B.C., under Thotmes III., is said to have designed the gardens of the temple of Karnak.

The Babylonian was another form of impressive gardenage, fitting companion to the Egyptian, and, broadly speaking, is its successor. Here we have, ethically speaking, the gardens of display for the sake of that which ministers to itself—namely, pride—gardens stupendous, magnificent, wonderful. The hanging gardens of Babylon and the Egyptian Sphinx are two of the seven wonders of the world. They may appeal to us by their unsurpassable greatness, and may perhaps benefit us in making us feel how small we are; but I should be sorry if my life were to be solely occupied in pronouncing upon the earth the display of wealth and pomp. I have to plead guilty to so doing sometimes. The man who pays the piper must be allowed the choice of his tune. It may not and is not always my own simple and beloved harmony of “Home, sweet Home,” and I must help him to leave upon the earth the impress of his regal wealth, since needs press and “home” must be maintained. The well-known garden writer, E. V. B., says somewhere, “For pride or any other reason the costliest monument is raised, but only love will plant roses to entwine the home and the tomb.”

To build or rear a garden as an edifice is one thing, and to emblazon it like the boast of heraldry is a feat, and thus we hear the expression of pride by the great despot Nebuchadnezzar, in a voice that causes his subjects to tremble, when gazing upon the mightiness of Babylon with its hanging gardens towering above all, “Is not this great Babylon which I have *builded*?” For *builded* indeed it and its celebrated gardens were, and they must have been a most striking, stupendous, and even refreshing sight, towering aloft, tier on tier of gardens upon columned arches with whatever freshness in the shape of fountains, flowers and verdure could be interspersed, a triumph of the genius of architecture and art, reared on high above, and in the midst of this Euphrates-girt stronghold, upon the otherwise flat plain of Dura. Although doubtless so grand, it must be classified in the category of “*building a garden*” rather than in the simplicity of Eden, where, as the Scripture and Lord Bacon have it, Jehovah “*planted a garden.*”

The following is the shortest and most reliable account of this world wonder: “This garden was 400 feet square, and the ascent up to it was to the top of a mountain, and it had buildings and apartments out of one into another, like a theatre. Under the steps to the ascent were built arches one above another, rising gently by degrees, which supported the whole plantation. The highest arch on which the platform of the garden was laid was 50 cubits, or about 90 feet high, and the garden itself was surmounted with battlements and bulwarks” (very imposing but very stern, as is the following). “The walls were made very strong, built at no small expense and charge, being 22 feet thick. Over the several storeys of this fabric were laid beams, and summers of large mossy stones, each 16 feet long and 4 feet broad. The roof over all these was first covered with reeds daubed with an abundance of brimstone (or bitumen), and then upon them were laid double tiles, joined with a hard and durable mortar, and over them all was a covering of sheets of lead, so that the wet which drained through the earth might not find its way into the foundation. Upon all these was laid earth, of a convenient depth sufficient for the growth of the greatest trees of all beauty and of all size,

to delight and impress the spectators. The arches had in them many stately rooms of all kinds and for all purposes. In one of these rooms was a hydraulic engine which drew water from the Euphrates by unseen channels and pipes, and maintained the multitudinous trees and plants in almost perennial freshness."

There are various accounts of the reasons for the formation of this mountain of gardenage and masonry. Victor Hugo says that they were made to gratify the request of one of Nebuchadnezzar's queens who delighted to receive therein the homage of conquered monarchs; others say that Semiramus, who designed Babylon, conceived the hanging gardens as part of the scheme.

Man, when he is intent upon pronouncing himself and showing his power, takes means other than *planting*. Anyone, he says, can plant, but it takes a clever man to *build* tellingly and to purpose. Whereas anyone who has tried to plant effectively finds how difficult it is, and with this agrees incisive Lord Bacon. "God Almighty first *planted* a Garden; and indeed it is the purest of human pleasures. It is the greatest refreshment to the Spirits of Man, without which Buildings and Palaces are but gross Handy-works. And a Man shall ever see, that when Ages grow to Civility and Elegancy, Men come to build stately, sooner than to garden finely: as if Gardening were the Greater Perfection."

The hanging gardens of Babylon were the greatest expression of the pride of man in the domain of gardenage ever known, one of the wonders of the world truly; the Garden of Eden was the truest expression of pure beneficence to the world in a material sense. Its Planter had no idea of making a first or an eighth wonder of the world, or of making anything classifiable in the category of the pride of pomp and display; but its wonders and secrets of pleasure, I believe, were, as are all lasting delights, not seen at once, but revealed after diligent searching, to Love. The ages at least have grown to "Civility and Elegancy" in part fulfilment of Lord Bacon's prophecy, but the majority are more captivated by the sight of an Eiffel Tower or an Earl's Court big wheel, and there are abundant evidences of lavish display in palaces and gardens—the Babylonian ideal I call it—but that planted garden of unalloyed pleasure—"the greater perfection"—is almost as remote as ever, and will ever be, it seems to me, only sought by the few who cherish Eden as their ideal, and are content to suppress the ever insistent vain-glorious self.

Between the Egyptian and Babylonian is inserted the Judæan phase of civilization. The Jewish nation reached its zenith of splendour under the rule of Solomon, who was endowed with the genius of a true poet, and who, as most poets are, was a past master in many arts; for he combined along with poesy the rare qualifications of architect, botanist and landscape-gardener, excelling also in natural history. For "he wrote of trees, from the Cedar which groweth on Lebanon to the hyssop which springeth out of the wall." His songs or poems, which are a formidable collection for even a laureate, numbering 1005, included his incomparable masterpiece, the rapturous canticles, the scenic background being all located, more or less, in Palestine gardens of dreamlike profusion and beauty.

"I made me great works; I builded me houses; I planted me vine-

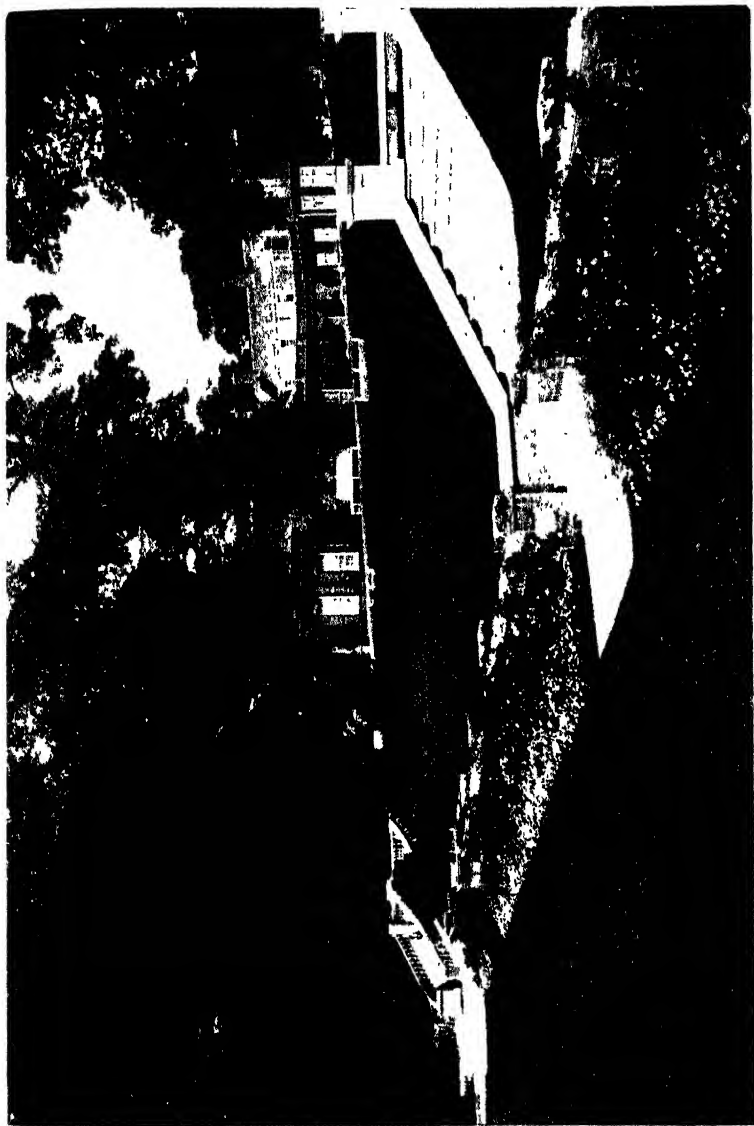


FIG. 65.—THE TERRACE AT THE HILL, HAMPSTEAD (W. H. LEVER, Esq., M.P.).
(To face page 368.)



FIG. 66.—ROUGH ROCKY STEPS AT SHREBLANDS, WINDERMERE (R. MAWSON, ESQ.).

yards ; I made me gardens and parks, and I planted trees in them of every kind of fruit " ; (this is more on Eden's lines than anything else we read in history) ; " I made me ponds of water, to water wherewith the wood where the trees are reared." Here is a brief account of Solomon's garden designing whose name and position, for the time being at least (however he failed afterwards) expresses the outgoings of man's heart and affections to the great God Jehovah.

It is recorded of the late Sir Robert Ball, when he wanted a figure to attempt to render to the finite grasp of the human mind the vastness of the heat and radiance of the sun, that he could neither seize upon or invent a better simile to build the proportions upon than Nebuchadnezzar's furnace heated seven times hotter than it was wont to be heated. In my subject I seek to follow Sir Robert's precedent, assured that if we could even get a conception by comparison with Babylon's famed garden of what was comprehended, and the order, the beauty and the unity of the first garden, we would have not only at once a framework and a basis, but a standard by which to try all ancient and modern attempts at design within the garden. All that has been pictured and discovered of ancient or medieval historical gardenage, Babylonian or Egyptian, Grecian or Roman, the imaginative dressed up in the guise of fable and song, as set forth in the gardens of the Hesperides, peopled with the white-robed maidens, which Milton does not hesitate to use in his attempt to heighten his imaginative picture of Paradise—all would fall short of that which is comprehended in one paragraph of the Scriptures which relates to Eden.

" Jehovah Elohim planted a garden in Eden eastward, and there put man whom he had formed, and out of the ground Jehovah Elohim made every tree grow that is pleasant to the sight and good for food." Later we read that Jehovah Elohim took man and put him into the garden of Eden to till it and to guard it.

It is well, when taking a survey of any stream, to get back to the unsullied source and spring in its purity, and give it due consideration before accepting notions, sentiment and hearsay. The present is a day when we can get tons of sentiment, but very very little that a thoughtful man can store ; in fact, the rubbish that is being heaped up round all professions is interminable, and still it comes. I believe one of the best attempts to idealize the compositions and delights of the garden of Eden was from the pen of Milton, and although I do not wish to pose as a critic of that grand, stupendous work I must confess that his description of Eden never fired me with enthusiasm. It does fill me with a feeling of majestic awe and wonder, as did the sight of the great Italian gardens. I quote a few of the best-known lines :—

" Eden, where delicious Paradise,
Now nearer, crowns with her enclosure green,
As with a rural mound the champain head
Of a steep wilderness, whose hairie sides
With thicket overgrown, grotesque and wilde,
Access deni'd ; and over head up grew
Insuperable highth of loftiest shade,
Cedar, and Pine, and Firr, and branching Palm
A Silvan Scene, and as the ranks ascend

Shade above shade, a woodie Theatre
 Of stateliest view. Yet higher than their tops
 The verdurous wall of Paradise up sprung :
 Which to our general Sire gave prospect large
 Into his neather Empire neighbouring round.
 And higher then that wall a circling row
 Of goodliest Trees loaden with fairest Fruit,
 Blossoms and Fruits at once of golden hue
 Appeerd, with gay enameled colours mixt :
 On which the Sun more glad impress'd his beams
 Then in fair Evening Cloud, or humid Bow,
 When God hath showrd the earth ; so lovely seem'd
 That Lantskip : And of pure now purer aire
 Meets his approach, and to the heart inspires
 Vernal delight and joy, able to drive
 All sadness but despair : now gentle gales
 Fanning their odoriferous wings dispense
 Native perfumes, and whisper whence they stole
 Those balmie spoiles.'

It is all very grand, or, as the poet says, delicious, and I daresay that terrific Hadrian's villa-wall if verdurous, would not appear so forbidding overtopped with the "circling row of goodliest fruit trees laden with fairest fruit," and the at once intermingled "Blossoms and Fruits of golden hue" with their "mixt enameled colours," viewed in the pure atmosphere, the purity of which enhanced the native perfumes,—“those balmie spoiles” that the winds stole and dispensed. The first part, “the woodie theatres” and “the hairie sides” of the steep wilderness at the top of which is the enclosed green, reads like a condensed description of those steep but prolific mountain sides of Brazilian hill forests, such as abound in that wonderful region of surprises of ruggedness and almost impenetrable amplitude of vegetation near Rio de Janeiro which I only know by picture and description.

There is in this poetic description of Eden a marvellous profundity which only those who are positively steeped in classic lore can grasp in its largeness of conception, but to the honour of the poet be it said that it is only the very exceptional mortals that can compress and arrange within focus such a wealth of classical, mythological, apocryphal and scriptural imagery, subordinating them all to the glorious subject before the poet's mind in ordered poetical design. Such minds find their counterpart in those great ambitious men who conceived those magnificent monumental Italian demesnes (we can scarcely call them gardens), and who made everything, water, foliage, flowers and trees, fall into their desired order, and made even the lines of the landscape fall into classical composition, and into their own preconceived heroic interpretation of nature.

Although I am strangely susceptible to such magnificence and profundity that the Italian gardens weave round spectators, I must confess that my compass, so to speak, always swings round to the homelier quarters, beloved by the true Briton, and the quiet beauty which old England bespeaks.

I am free to admit that it is possible to have the most impressive spectacle of acres set out in all the wealth that rich flowers can show,

well-grown trees and shrubs set amidst imposing masonry, and yet not have as much quiet beauty as a handful of mixed seeds sown indiscriminately are capable of producing on a piece of waste ground, provided the seeds are not too much mixed. An artist's wayward eye desires the prodigality of the thorn and the thistle, but this is forbidden in Eden, where order *does* prevail, which curbs the ground-greedy laurel or privet, shall we say, and the riot of the perennial sunflower. All wise planters know that there is a place to plant everything, although they may not be skilful enough to plant everything in its place. Who is? No one!

Easier, far easier, is it to build skilfully than to plant wisely, and when in any measure it is done, who applauds? The very, very few. It is a more direct road to gain applause, though not altogether easy, by perpetuating an atmosphere of weirdness and awe, as did the Egyptians, or by making a display if the sources at your back are rich and powerful enough, as did the Babylonians.

In Solomon's gardening and in Eden there is nothing to excite wonder. Here are the contrasting principles which I wish to pronounce. In the Babylonian and the Egyptian there was, and this was their object. Coleridge said that "in wonder all philosophy began, in wonder it ends, and man's admiration fills up the interspace; but the first wonder is the offspring of ignorance and the last is the parent of idolatry. There is indeed great inconsistency in man's wonder. He will wonder at the works of man but not at the works of Nature. How often does an archway of more than ordinary span and beauty excite his wonder, while the arch of the heavens with a span measureless and a beauty divine is looked upon with a cold indifference."

A piece of man-made mechanism calls forth his wonder whilst the marvellous structure of his own body is seldom or never contemplated with interest. When people are enamoured of the enchantments of Blackpool it is hopeless to attempt to arouse them to the real wonder that is pent up in an acorn or a Sequoia cone, telling them that in the latter case you hold in your hand a pent-up vital force which if brought into contact with the unseen chemical forces of the common earth in its own congenial clime and habitat will abstract therefrom and assimilate the carbon of the common atmosphere (thus making it fit for our breathing by the process) and rear a living edifice of beauty almost half as high as their ugly Eiffel Tower.

Nor is Horticulture and Garden Design free from extravaganzas, myself being as great an offender as anyone. Is there not a danger of being so infected by monstrosities, by the curious, the quaint and the rare, with hybrids, sports and phantasies that the special, delicate and personal charm of a plant is lost? I know it is difficult to draw the line, because in a garden you must have the best (though this does not imply that all should be monstrous), and I do not wish to decry the beauty of hybrids and variegations, but I hold for the temperate mean that the characteristic Eden-like beauty, the natural grace of each respective plant, or of a tree its true habit of growth, is more than any irregularity or sport, more to be desired than an inordinate amount of flower even.

I do not suppose there was anything rampant in the united scheme of design in the Garden of Eden; every tree or plant was no doubt designed

for the niche it was to fill, and it filled and fitted its place exactly and appropriately in such a way as nothing else would, and to even see this trait in nature I submit there must be the opened eye.

Although Eden included within its borders every kind of tree, flower and fruit good for food and pleasant to the eye, there certainly would not be any of that straining after variety—that attempt at a little of everything which is the bane of the so-called landscape garden and so destructive of its restfulness. I have made a full confession about the garden of display, and I do not fear being honest about the majority of the landscape gardens so-called. Ninety-nine out of every hundred I have seen are unrestful, and many are very tame and timorous attempts, and the motley mixtures suggest anything but Eden's quiet breadth expressed in boldness, in freedom and nobility of design; yet, as always in Nature, its breadth of handling was outwardly unapparent, the very reverse of the towering gardens of Babylon. It could only have appeared, as Milton describes it, to an opened eye.

In the ideal garden of pleasure, Eden, there was no four-square house nor one with a skewed plan in the modern fashion to begin with, and no need to cut off its angularities with appropriate climbers, and none of the utilitarian devices with which we dissemble and seek to render picturesque, such as slating and drawing-off rain and smoke by pipes and chimneys, no roads or walks for wet days to haggle about, whether they ought to be straight or curved; in fact, clothes even were not a necessity to hide the graceful perfections of the human form.

In order to design gardens with originality combined with that secret indefinable charm which is their true heritage, we must combine cunningly the Ethical, the Historical, and the Practical branches of knowledge with such ease that our garden clients can call upon us to sing them a song, write a poem or perform any other feat proficiently, I mean practically, not in words, and we shall joyfully and skilfully respond without even conveying a suspicion of the old tomes and the smart up-to-date text-books whence it has all been gleaned.

Speaking practically, a garden in most cases has to adapt itself to the dwelling it accompanies, and the result is judged accordingly; and when it is remembered that everything there in its disposition is regular, and that the greater part of the furniture and adornments fall into some geometrical outline, it follows that regularity to some extent must follow without. Again, when we have apportioned off without, several rectangular spaces, as a terrace for instance, in most cases the only solution is to dispose the same with regularity as to plan at least. This I do not wish to pursue further at the moment, for every site must be taken together with the house already designed and fitted there, and has its own solution.

GARDEN DESIGN : COMPARATIVE, HISTORICAL, AND
ETHICAL.—II.

By THOMAS H. MAWSON, Hon. A.R.I.B.A.

[Lecture delivered September 15, 1908.]

THE delight of searching out and meditating upon my subject has given me many choice thoughts, and many helpful ones in my practice, because what may be to most, merely the perusal of accounts of ancient gardens, is to me and to others "in the way" of designing gardens, a visible picture—a recreation of the mind—and it makes one long for the power, not alone to present to my readers word pictures of these vast accumulations of ancient thought and skill, but to give coloured representations of them. Such skill, however, demands the devotion of half a life time, and even then, as we see in such men as Sir Lawrence Alma-Tadema, one man can only do a measure of justice to one phase or era of this vast subject, as he has done to the ancient Roman phase of architecture and gardenage. Even then we cannot people them; we cannot convey sight, and scent, and sound, nor transport our beholders to the atmosphere: in short, our attempts lack life, and, at best, all art combined, whether descriptive or pictorial, is not a substitute for life.

It is only as we apply ourselves to enter into, and cultivate our own particular branch of horticulture or of design, that we can succeed in imparting to others what has stirred us, or that we can hope to be in that condition to receive. The beholder or listener must, first, in his inner consciousness, be in possession of life, the greatest gift of all, and that life must be at least fairly vigorous and growing; otherwise he will only get his ears tickled by lectures—pictures will only please the lust of his eye: he will be more amused than edified. If the light within us is life, we find that we cannot sever the past from the present, any more than we can sever our language from the past.

Near certain of the mountain farms of Westmoreland there are old pits where farmers used to burn mountain turf, which yielded a nutritive manure by a process of smouldering like to modern charcoal burning; but this process had to be stopped because, on a mountain where several farmers shared the right to pasture their sheep, one man consumed the fine mountain turf at the expense of the others. In our present occupation, however, we can fearlessly burn and utilize to advantage the ashes which are made available (although, be it remembered, there is a certain skill required in rendering them serviceable) to enrich our gardens in the way of design.

This was my lead in, as pointing to the trend of my present lecture, but I found later that the deep-thinking Aristotle (in quoting whom I am calling a witness before I have declared the case) had forestalled me, and had even distinguished both the elements for enrichment, and also

the enriched growing things themselves, under two heads—namely, the wild which spring and thrive best from residues, and the tame or cultivated plants which thrive best from pre-digested or cultivated nutriment. "Some plants," he says, "are born and grown by means of nutriment well digested; and others, on the contrary, spring from residues and materials quite different; cultivation causes the nutriment to digest, and fertilize it; this it is which produces fruits good to eat. The plants which arise from this tempering are called tame plants, because the art of cultivation has been profitable to them and has effected to some extent their education. Those, on the contrary, which art has not been able to direct, and which are derived from materials of which the conditions are contrary, remain wild and cannot shoot in cultivated ground, for nature tames plants in rearing them, but these other plants can only come of corruption." This is rather hard on the wild trees, which we depend upon as backgrounds to, and even as the furnishers of, our gardens, such as the oaks, ash, sycamore, elm, beech, and maples, and so forth, but it is seeing things through the spectacles of the Greeks, who delighted in strenuous cultivation, and for the present we will sit down with it.

Change and decay in the garden is inevitable, and the worthiest are those who can turn the products of waste and decay to the profit of the differing living things that remain.

The first question that presents itself is: Is our ideal a worthy one? Is it replete and vigorous? The ideal garden, which I rapidly outlined in my former lecture, is the one that nearest approaches the *planted* gardens of Eden and Solomon. The next important question: Is the position and environment suitable? The *built* Egyptian and Babylonian gardens, introduced in my former sketch as a background, had not a suitable environment, therefore there was every excuse for their artificiality. This excuse we in Britain cannot generally plead, our environment is suitable, if not too circumscribed, for the ideal garden of freedom. These essentials settled, let us cull and glean whatever we can to nourish and strengthen our ideal. Whatever has grown obsolete, and what in other ages has decayed, let us put into the crucible, or else dig out from the rubbish heap, along with the well-decayed leaf mould of former generations, and apply it wisely for purposes of growth, and for invigorating that which has present life.

I now purpose to take up accounts of the Greek and ancient Roman gardens. This perhaps is a summary way of dealing with garden history, as much might be gleaned no doubt with great labour and much research from the intervening phases of civilization, but, as I have previously said, I want to keep the ethical uppermost and use the historical as subordinate and illustrative.

Speaking of the ancients as they appeal to me personally, neither the Egyptians nor the Babylonians figure upon the pages of history as notable or desirable dynasties, but when we mention ancient Greece there is a change at once; we pass out from under the ponderous arch of frowning despotism and breathe a freer atmosphere. We feel that here at least is a bid for liberty, where we may pleasantly break into the romance of the ancient world of myth, of noble architecture, and great deeds, and

where we may unbend from the former autocratic austerities and make a transfer from despotism to patriotism. The latter is perhaps the more arduous, yet works from happier motives. In contemplation of the Greek civilization we may escape from the fearful awe of the Egyptian and Babylonian idolatries, and may leave our own ordinary menial and mercenary age, and ponder their pleasing and amusing reveries or legends, as we see them projected upon the screen of their poetic minds, and pursue them in their own imaginative Elysian fields and groves of Arcady. The legends were serious enough to them; they were their sacred writ, and it must be candidly admitted that some of the myths were shrewd guesses at truth.

If power and splendour be the objective, I have no doubt that both the Babylonian and Egyptian are superior to the Grecian and Roman, the latter being more and more decadent. "Thou O King," was said of Nebuchadnezzar, "art that head of gold," the Medo-Persian dynasty the breast of baser silver, the Grecian the thighs of bronze or brass, and the Roman Empire the feet, part of the iron of imperialism and part of the miry clay of democracy, which will never mix. But we are viewing history from the gardener's standpoint, and our keynote in the garden is rest amidst orderly freedom, and certainly the Grecian type of civilization appeals to our tastes more than its Egyptian and Babylonian predecessors, and is more inclinable towards our model.

It is instructive from an horticulturist's standpoint to note how the blend of the extremely hardy nomad Scythian races and the enduring Spartans, with the refined cultured Athenian races, combined to make the Greeks what they are famed for. It is the same principle in which we set about to improve the species of, say, a blackberry. We take the largest and most luscious produce of culture, and unite it with the hardest Siberian product that has thriven for generations under the most arduous conditions, and the result is *ne plus ultra* for its time at least. The Medo-Persian race were similarly a blend of the hardy hill-dwelling Persians grafted on the Median stock, "the hardy scion and the baser stock." What is true of races is true of individuals, to wit Cyrus of kingly stock, but peasant-bred, and William the Conqueror, the son of the tanner's daughter of Falaise.

When I sat down to make the study of Grecian gardens I propounded to myself a problem something after the following: Given such a rarely blended race, nimble and strong in mind and body; seeking and presenting in their unsurpassed sculptures the perfection of the human form; dwelling in perhaps the most romantic country in Europe (not the most productive); who could perfect a language replete with the finest of inflexions; their architecture of incomparable proportions and fitness; the pioneers of modern science, building up all from the barest elements of logical deduction as we see in the books of Euclid: what, I conjectured, must their gardens have been? I must confess that either from insufficient data, or from my failure to enter into the spirit of the always arduous, strenuous Greek view of life, I was disappointed with the answer. There is little or nothing we can store in the way of the rest to which a true garden ministers, and which in fact is the very soul of a garden, being the keynote of the ideal Eden, "that delicious Paradise," where

the heart is so inspired "with vernal delight and joy able to drive all sadness but despair." If ever you suffer from the sadness which borders on despair, don't seek sympathy from the Greeks. If you are sound in heart and limb and with a brain to match, and are almost proof against exhaustion, then Greek can meet Greek, but they provide no garden hiding-places for such as poor Yorick. Alas poor Yorick! do you know him, outmanned in the struggle, bewildered in the turmoil? They provided few places—

Where good men disappointed in the quest
Of wealth, and power, and honours, long for rest;
O! having known the splendours of success,
Sigh for the obscurities of happiness.

These enclosures, it seems to me, were all too morbid for those who spent their time out of doors on the *qui vive* to see or hear some new thing.

I think the majority have an erroneous idea of the country of Greece and its configuration. The general impression is that it resembles Italy. The following from the pen of Mr. Ormerod, a recent traveller, will convey a better idea of the country than a quarter of a volume of ordinary writing:—"A journey through Greece shows you at once why the people made for the sea. Greece never could have supported its population. The mountains come right down to the coast and tumbled the Greeks into the water. A people cannot hang for ever on those bare hills, and once in the sea they had either to make themselves boats, and quick too, or sink. They chose boat-building. And that briefly explains Greek foreign exploit. For Greece is mere rugged mountain. Here and there where the mountains miss each other, bits of valleys slip in, and, taking their chance, elbow themselves out into plains. You will see no oxen knee-deep in grassy meadow ponds, with an evening sun setting in mild glory at their feet, nor will you inhale the smell of the rich brown earth after rain. But yet Greece is very beautiful. The jagged crags strike against the perfect arc of the heavens and print themselves masterfully along it; the great sun pierces irresistibly into every valley, robbing shadows of their depth and gloom. In the Corinthian Gulf stretches of vivid green finish off into a straight line, and bands of deep blue suddenly begin. In little creeks white-crested greenish waves run inland and dissolve in lagoons of winey red, and the islands gleam on the waters like plates of burnished gold."

This traveller helped me to solve the problem that I had set myself—namely, the why and wherefore of the lack of attention to garden design in ancient Greece, and the scant references to it in their literature, since he confirmed me in my surmise that only the great and the best were acclaimed by them, and their national demand was for perpetual youthfulness. He says: "Ruins in Greece are not good, except the best, but they are very good. The Propylæa is the grandest portal through which a triumphal procession ever filed, and the Parthenon the most majestic of all temples. One gets a strange impression of finality about it all. 'These beautiful old buildings,' I heard an enthusiastic gentleman exclaim. I cannot tell you how wrong that seemed, for to me the whole appeal



FIG. 67.—IN THE GARDENS AT FOOT'S CRAY PLACE (S. J. WARING, Esq.).

(To face page 376.)



FIG. 68. — IN THE GARDEN AT DUFFRYN, CARDIFF (JOHN CORY, ESQ., D.L.).



FIG. 69.—FORMAL USE OF WATER IN THE GARDEN AT THE HILL, HAMPSHIRE (W. H. LEVER, ESQ., M.P.).



FIG. 70.—BRIDGE AND ROCKY STREAM IN A WEST COUNTRY GARDEN.

was of their imperishable youth. The crumbling touch of age may add a charm, but is wholly adventitious and not intrinsic." The severe line of the column and the firm strength of the curves have nothing to do with the beauty sentiment, they but pronounce the sentiment of unfailing youthfulness.

This ideal of perpetual youthfulness is not that view of life that the garden ministers to, although I do not think that the suspicion of it is altogether absent therefrom; change and decay, rejuvenation through death is the rule that reigns in Nature, she being most lavish in the waning autumn of fruitfulness and most resplendent in her decay. Many of my readers will respond when I say that a garden and the tending of flowers is equally, or perhaps more, adapted to the aged than to the restless youth who bounds

From hill to hill in discontent,
Content when most uneasy.

There is no pleasure so adapted to those who cannot enter into the stress of active life as the tending of flowers, since it supplies that degree of exercise as necessary for the preservation of health both of mind and body, as food. The delicacy of the form of flowers and their mute appeal to gentleness, innocence, and sympathy, along with their frailty, commend them to the finer fervour of the female mind also, but the ancient Greek was nothing if he was not of the prominent heroic calibre. War, sport, physical culture, rearing noble architecture, the merit of which even in its ruin is its youthfulness, as Mr. Ormerod says, were extolled by them.

I do not deny for a moment that in the philosophy of the garden there is enshrined such profound truths that the deepest thinking man of science need not go beyond its confines, but it is not strictly speaking his province, I think the unguided idiot's mind that calls forth sympathy is more welcome here almost than he. Over the portal of my ideal garden—my refuge from the world's distracting agitations and ambitions—I would inscribe: "Whoso seeks self-glory let him not enter here." If you are determinately set in the way of these ancient Greeks, and for the sake of one monstrosity will sap the strength of ten, very well then emblazon your name across the show table, and in the horticultural magazines or the local newspaper if you like. If the "fatuous litch" for rarities is yours, and you must at all costs lend your name to the already bewildering labels attached to the innocent roses, dahlias, rhododendrons, fruits, and shrubs instead of assisting us poor selectors by a simple appellation which will be at least an indication of their differentiation, such as 'Crimson Blush,' 'Scarlet Tipped,' or 'Purple Blot,' then I must leave you to go the way of the decline of this wonder-producing nation; for perhaps the same rose that greets you to-day as 'Baron Rudigore,' a little later we meet re-named as 'Squire Stopgap.' However, enough of this; suffice it to say that the concentration upon the conceit of individual growth does not tend to the cluster of wholesome relationships each to each of plant and flower and the cheerful homely fellowship and generosity which goes to make up the ideal garden.

I quote from Homer to show how true at all costs the Greeks were to their ideal of perpetual freshness, which we simulate by our forcing houses;

they evidently sought it naturally, although I confess I do not see how it was attained, but here it is: "And within the courtyard hard by the door is a great garden, of four ploughgates, and a hedge runs round on either side. And without the courtyard hard by the door is a great garden, and there grow tall trees, blossoming pear trees and pomegranates, and apple trees with bright fruit, and sweet figs, and olives in their bloom. The fruit of these trees never perisheth, neither faileth winter or summer, enduring through all the year. Evermore the west wind blowing brings some fruits to birth and ripens others. Pear upon pear waxes old, and apple on apple, yea, and cluster ripens upon cluster of the grape, and fig upon fig. There too hath he a fruitful vineyard planted, whereof the one part is being dried by the heat, a sunny spot on level ground, while other grapes men are gathering, and yet others they are treading in the wine press. In the foremost row are unripe grapes that cast the blossom, and others there be that are growing black to vintaging. There too, skirting the furthest line, are all manner of garden beds, planted trimly, *that are perpetually fresh*, and therein are two fountains of water. These were the splendid gifts of the gods in the palace of Alcinoüs."

Lord Bacon in his celebrated garden essay makes a poor bid for perpetual freshness even in "The Royal Ordering of Gardens." His directions for outdoor gardening during at least three of the winter months read all right on paper, but when it comes to actuality, well, the Riviera or the Canary Isles are found to be preferable to the *Ver Perpetuum* of a prince's garden of thirty acres. I agree, however, with his lordship in his ideal: "I do hold in the Royal Ordering of Gardens, there ought to be gardens for all the months in the Year, in which severally, things of Beauty may be then in season." We English make a poor show at perpetual freshness all round, nevertheless the ideal is right.

I say again what I have previously said in other words, that you must have within the garden a marked improvement upon the wild fruits and flowers of the field, for "a garden is man's report of earth at her best," where the free, artistic prodigality and disarray of the wayside is curbed, but it is not true gardening that concentrates solely upon the monstrous and the rare. From compulsion we must tie up the giant sunflower and "hollyhocks tall" in the rear of the border, and everything that would break and hang untidily, but let us not as the Greek civilization did, adoring what was consummate, despise the husbandry of shepherd and gardener; let us learn to esteem the secondary or the seeming trivialities; let there be an air of generous freedom and intricacy even in the masses, which constitute the bulk; clusters of sweet relationships rather than a forced individualism, and the cheerful fellowship as of a family in that domain apart.

Where order in variety we see,
Where all things differ, yet they all agree.

The happy interchange of one flower with another, not always pruned, tied up, and drilled erect like soldiers, but rather the branches of one tree let to playfully peer into and mingle with the untraceable light and shadow-play of its neighbours. Agreeing with the extreme selectiveness and the perfecting of the rare ideal (which I may say is a synonym of

ancient Greece), all honour to those who spend their lives perfecting our garden accessories, the various strains of fruit, grains, nuts, or flowers. So did Phidias and their most celebrated sculptors in their own line. Their perfected Apollos and Venuses were the proper proportioned features and limbs of many, and were never portrait models of any one man or woman. This selective department of the ideal garden—an essential one—like all scientific impulses is ever fraught with anxiety to be pursued within its precincts, agreeing not with the restfulness which should predominate everywhere, as becomes a place apart from the toiling and struggling world around, with the restful spaces of refreshing grass interspersed with trees, restful interludes of one family of one kind of tree, and restful breaks of one kind of flower amidst the kaleidoscopic gaiety of lavish purple and gold. Decency and order with discriminating variety is the foe of confusion and riot, which is as much to be deprecated as stiffness. If we concentrate upon a forced individualism I cannot see how we can avoid stiffness, which to some extent may be allowable in archaic or scholastic pursuits, such as architecture, languages, and conventional ornamentation (where everyone admits the Greek types *were* stiff), but it is horrid if paramount in a garden, where the order is in variety and where some measure of intricacy is harmonious.

In a building you can once and for ever fix the lines unalterably and the height of everything, but "a garden changes from season to season, and the growth and decay of its vegetation alike alter its pristine aspect." No one must ever expect to count the flowers in a garden and apportion them off in the ordered rhythm of conventional ornamentation as seen within or without the building, or in the so-called Greek honeysuckle ornamentation, which needs to be understood before it is condemned, being primarily symbolic and executed as their standard test of firmness of line and steadiness of hand, rather than for its merit as ornament. The Greeks allowed no dabble and scrabble as we do when we tack together our fearful and wonderful conventional friezes, which often have this morally to commend them: that they resemble nothing in the heavens above, nor on the earth beneath, nor yet in the waters under the earth, and therefore do not come under the ban of the Mosaic law.

I am aware that, in taking upon myself to say anything is stiff, or to criticize the Greek presentation of beauty in arts and architecture, I am doing so with an Englishman's green spectacles on, the focus adjusted to our own picturesque green meadows studded with fat cattle, flowing rivers and purling streams, neat scattered cottages and their own company of healthy swains and happy children, the humble antique church, set with umbrageous churchyard elms, together with all the other accompanying sights and sounds with which we are so familiar.

In all criticism we must not consider only the unbalanced popular view which contents itself with the mere observation of these material objects and their combinations, but must also consider the deeper and philosophic view which involves the inquiry into the prevalent moral, spiritual, and general composition of races. To put the matter in a homely way, consider how incongruous a robed Greek senator would look stalking about our picturesque lanes such as I have described; or, for your amusement, take a reversal, and transport one of our ruddy swains from his

peaceful surroundings to the graceful lines and academic grandeurs of Mars Hill at Athens.

However, in all matters you have to strike common ground somewhere, or be content to wander for ever in the wide pathless wilderness. After weighing up all these balancing philosophic considerations in gardening matters we have to return to Nature. Her greatest factors, her nobility—in every land—are trees. A tree is a tree whether it be in Palestine, Egypt, Babylon, Greece, Rome, or England, and a tree resents stiffness. Another has said: "The natural architecture of trees never suggests a plan; in viewing them the mind regrets the very notion of intentional symmetry while rejoicing in the effects of some natural completeness of design, yet every well-grown tree has symmetry of a kind. Another element in the beauty of great trees is the constant sense of inability to number or become familiar with the enormous detail of their forms. The eager brain which would grasp all their beauties, first in impression and later in detail, so as to carry away the splendid catalogue of their charms, is baffled and rebuked by the silent complexity of their myriad parts. They are genii, latent forces dominating their own realm; they owe nothing to man, not even the sowing of the parent seed, and human pride asks how came they to be there, and to be what they are, an embodiment of that idea of magnificence which we, by stiff regal grandeur and tortuous art, wish to realize, and fail." Trees, which are the garden designer's indispensable stock-in-trade, are what the text is or should be to the preacher; hereupon hangs both all the law and the prophets; yet too often, with both preacher and garden designer, the text—the essential—is only a peg to hang a few tawdry rags of his own upon, and likewise the garden designer reverses the order and puts essentials in the second place, with a view to the pronouncing of himself or his client's ostentation and wealth. I hope you will forgive me when I say that this is a sin which I have many times committed, and if it is a sin that has to be paid for in Purgatory, it will take a big sum to get me out—that is, if the penalty is in any way commensurate with the amount of money spent in outlay here.

The great dividing line of the two styles of garden design is this: we either accept trees, our greatest factor, as they are and bow submissively, or else we set about, as did all the five early forms of civilization, to tease them and make them fit our own heroic devices, as did the Egyptians, the Babylonians, the Medo-Persians, the Greeks, and their followers and imitators, the ancient Romans. The echoes of the last and their traditions may be caught in Italy to-day in the present ruined and restored medieval gardens of the Pope and cardinals.

I am able to give only one quotation regarding the Medo-Persian view of gardenage, which is instructive from two points of view. First, in presenting to us their national ideal; and, secondly, as to the light in which we see Cyrus the Great, the welder of the two races, which combined made the Medo-Persian world supremacy. Like many of our most enterprising business men he was able to find time for everything; and in his relaxation measured, set out, and planted the trees in his park himself. It is the aimless man of unlimited leisure that finds time for nothing. The quotation is as follows:—"When Lysander brought

presents to Cyrus from the cities of Greece, that were his confederates, he received him with the greatest humanity, and amongst other things showed him his garden, which was called 'The Paradise of Sardis'; which when Lysander beheld he was struck with admiration of the beauty of the trees, the regularity of their planting, the evenness of their rows, and their making regular angles one to another; or, in a word, the beauty of the quincunx order in which they were planted, and the delightful odours which issued from them. Lysander could no longer refrain from extolling the beauty of their order, but more particularly admired the excellent skill of the hand that had so curiously disposed them; which Cyrus perceiving, answered him: 'All the trees which you behold here are of my own appointment; I it was that contrived, measured, laid out the ground for planting these trees, and I can even show you some of them that I planted with my own hands.'"

Space forbids my dilating further upon the use and misuse of trees and how they should dominate. I hope to deal with this in the next lecture on the practice of garden design, but this quotation is introduced to prove my contention that Cyrus forced his trees.

I fear I have not left myself much time to devote to the ancient Roman gardens, regarding which we have much data and information, so much that to do any measure of justice to them would need a separate lecture.

It is difficult to define in a few sentences wherein the Romans differed from the Greeks in their civilization, their arts, their ideals, and wherein their deterioration can be seen, yet here it is that we ought to start to get a just estimate of their gardens. It may be disputed by some, but it must be always borne in mind that the chief factor you have to deal with in ancient gardenage is the religious element; and, moreover, I do not limit or confine the motive for the ancient gardens alone to religious pervasion, it certainly was a great motive in medieval gardens, and not alone gardens but domestic architecture also. What a number—I might almost say the majority of superb survivals of medieval gardens in this country—have the church or cathedral as neighbour, and often only the church wall as a dividing line; sometimes the garden is the cathedral close itself. Added to this evidence, to prove the preponderating permeation of the religious, we find numbers of old farms and mansions built in the Gothic style with or without chapels. If further evidence were needed as to the symbolic meaning conveyed by garden arrangements and forms, and how these religious sentiments have become national, I could clinch it by a reference to the Japanese and in lesser degree to the Chinese.

If I was asked to define briefly wherein the Roman imitation declined from their Greek ideal, I would say that, instead of maintaining a national ideal, which they reckoned to have, and which in time of national catastrophe they were in a measure true to, when we read of them flocking to their national temples and prostrating themselves and imploring victory, instead of the national they fell into individualism to their own household gods and goddesses. This decadence was fostered, no doubt, by the always divided interests of the patricians or nobles and the plebeians or common people. Their national system was gradually replaced by a

mongrel one, and their gods and goddesses became legion, and so families of substance either engaged a priest on tramp or salaried him from one of the temples, and they multiplied his hero statues and his gods and goddesses in his garden according to the particular cult of their priest or their own ideas.

After all, it is not strange that a garden should be held both by heathen and Christian nations to be in accord with the tenderest instincts of mankind. "It is the purest of human pleasures." As one poet sings :—

The kiss of the sun for pardon,
The song of the birds for mirth,
We are nearer God's heart in the garden
Than anywhere else on earth."

There is here that which fosters those "thoughts which lie too deep for tears." Purity, wise order, forms too exquisitely fine for the eye to trace, vistas and avenues, and flowery ways which lead on without harshness or retaliation but tenderest sympathy to the striving and cruel world beyond, and yet again allow and foster that which is equally needful—restful meditation.

"A thing of beauty is a joy for ever," says Keats; yet this is the aspiration which we know that nothing earth-born can attain. Even in the garden, where we are nearer God's heart than anywhere else on earth, it is only by glints and gleams that we see it. What springs of the earth is earthy and dies with the earth; beauty is not so much in the thing itself as in the thoughts that spring therefrom, and as our mind is directed amidst loveliness to a fairer region as to which all that is transient here is but type and shadow, and where change and decay are not. This is the problem the Greek and Roman minds struggled to express through the labyrinths of philosophy and mythology, and their incarnated and deified representations of thought as seen in their sculptures and gardens, and their handiwork is the result, or rather all takes colour and shape therefrom.

I say it without any fear of contradiction that the religious, whether mistaken or true, is the deepest and most serious impulse in man, even in a material age like the present; this and beauty are inseparable, and in order to wisely design a garden these kindred impulses must flow strong in you. As in many another instance we meet here a paradox, for it is only as you know the impossibility of your efforts that you can design effectively. It is said of Turner, the artist, that the more he wrestled to convey the problems of light through the poor medium of colour, the more he chuckled each time he was thwarted and defeated. The uninitiated think we triumph by our successes, but whether artist, architect, designer, poet, or whoever it is that seeks to simulate beauty, when he knows himself he triumphs like Jacob of old, not by might of wrestling, but in weakness crippled and clinging, and we by our defeats. No glory to us!

No presentation or representation of beauty can be complete in itself. Nothing material and no amount of what is material, no matter how finely disposed and well ordered, is a finality; it lacks continuance and completeness, and therefore it lacks everything. No progression, in fact

nothing, is a finality in itself ; I always look askance at the garden where they proclaim that they grow a little of everything. The garden of Eden was a finality, with every kind of tree that was good for food and pleasant to the eye, but has there been one ever since? Far better grow fewer plants well, such as the soil and the aspect foster. Let us know our limitations. "Though God hath made everything beautiful in His time, yet He has also set the world in their heart so that no man can find out from beginning to end, the things which God hath made."

THE PRACTICE OF GARDEN DESIGN.

By THOMAS H. MAWSON, Hon. A.R.I.B.A.

[Lecture delivered September 29, 1908.]

IN meditating upon the present lecture I fell to wondering what line I should be expected to strike. I am afraid that some who have to do with the severely practical side of getting a garden into form will expect me to deal with all the hundred and one devices that go to the shaping and fencing of a garden, and will expect me to begin by being submerged under the removal of tons upon tons of earth, blasting rocks, adding to this upheaval by carting stones and gravel and ballast, bricks and mortar, manure, and so forth *ad libitum*, truck loads of trees and shrubs, of gate fencing, iron gates, espaliers, greenhouses in sections, wire netting, casks of tar, and then, gradually working my way to daylight and order by "bits of oily paper which he calls his plans," evolve order out of chaos. I dare say it would be very easily possible to make an agreeable, entertaining lecture on these lines.

There are many men whom you could embed amid a confusion such as I have described, and you would be absolutely sure that the result would be at least creditable, and with certain men, having the engineer's bent of mind, the bigger the upheaval the better they like it; but neither of these two men has exactly the qualifications needed for designing and disposing a garden; neither the trustworthy man that can always be relied upon to do everything creditably, nor the engineer that is never outdone with the immensity of an undertaking. The engineer works entirely on the principle of calculation, and I would not for a moment put a slight upon his needed co-partnership, in large works particularly. I desire, whenever possible, to have my work in capable hands, and to launch it upon a correctly estimated basis; but unless a man has the faculty of seeing in these mysterious heaps and accumulations, unsuspected possibilities, as an artist does in the heavy daubs of thick paint which he throws about the canvas, I do not think he has the right talent for designing a garden. I am not going to enter into the way these ideas are fostered or cultivated; if you are educated to design gardens you must have the impulse or spring of fertile ideas, and know how to clothe them with effective expression.

It may be that you are conscious, after you have struck some particularly happy and original vein and got it nicely carried out, that you feel the job is only partly your own doing, and that a good deal of it, and probably the best part, has to come by a process which you cannot explain. A satirical critic, seizing upon the remark made by a landscape gardener, who stated that he was wonderfully helped in the execution of his work by the accidental developments and the unlooked-for groupings that occurred, turned it to his own account by saying that landscape gardening is an art that relies upon accident for its effect.



FIG. 71.—PRIMULAS IN THE WILD GARDEN, ESKDALE, WINDERMERE (RUSSELL REA, ESQ.).

(To face page 384.)

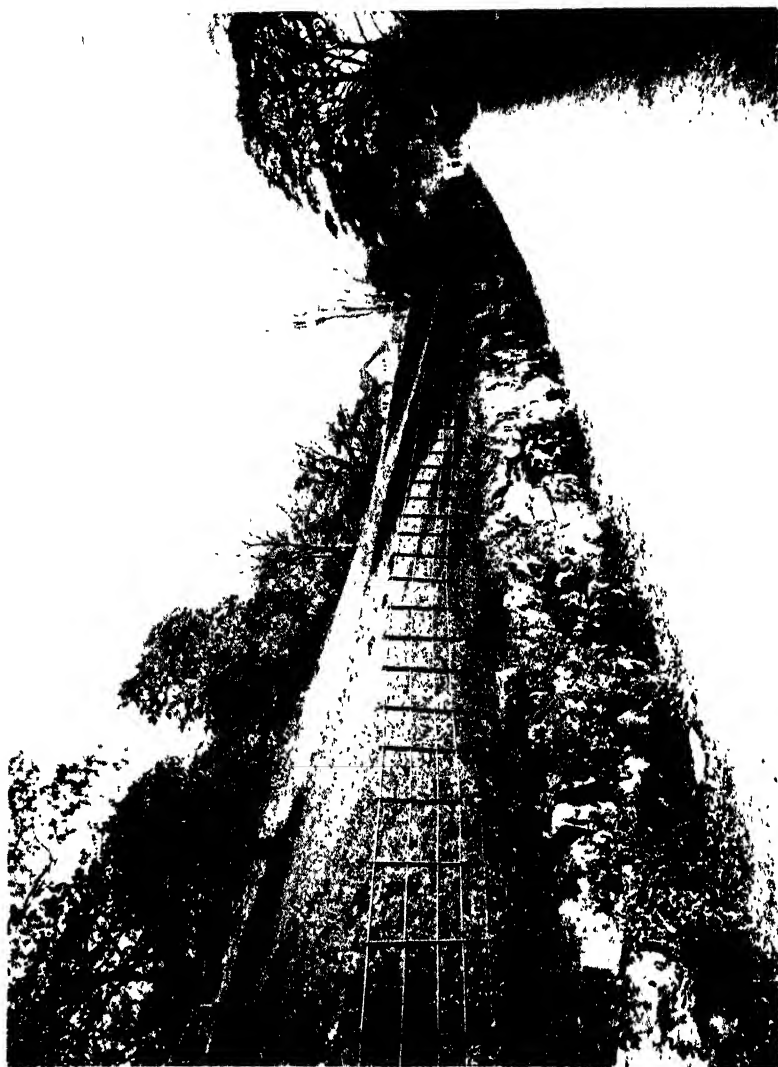


FIG. 72.—A BOULDER-BUILT WALL, WINDERMERE.

I for one am not prepared to quarrel with this critic, and I may add that Englishmen have no need to quarrel with the accidents of chance developments. From the days when the storm wrecked the Invincible Armada to the days of the late Boer war we have come through, or rather bungled through, often more by fortunate accidents and by the fortunate tumbling into a set of circumstances—in other words—more by chance than by deliberation. For my part I rather rejoice in the satire of our critic, though in the main he is wrong. Everyone who aspires to lay out a garden must believe in a proper cohesive plan as a basis of operations, and it is no discredit to an artist to be able to prepare a well-thought-out plan, accurately measured, with levels and sections, with every garden department arranged for handy and convenient control and ease of working.

A great number of clients that have employed me have started without this necessary plan thought out in its bearings and levels; for the most part they have been men of excellent and original ideas, but they found as they went along in this haphazard fashion, which the architectural critic makes fun of (and here he is right), that they had to keep altering and transplanting and re-forming here and there to accommodate each nice bit that they became possessed of, and in the end they got discouraged. Whereas, if they had started with a scheme, or at least a policy, which does not by any means bind them to a hard-and-fast agreement to carry out all the details or features, almost all their disappointments and much expense and worry might have been saved. This, then, is my first piece of advice to all who desire to lay out a garden, large or small: Have a well-thought-out plan on paper, drawn to a workable scale, and, if the ground is not perfectly flat (it is rather remarkable sometimes to see the surprise of uninitiated people when you tell them how much rise and fall their seemingly level land really has), have a proper section also made to accord in scale with the plan.

I never knew this method to fail, and I have clients who have been at work for over twenty years who have garden and estate improvement plans framed in their business room or estate office, and each season, as the time comes round, when the garden is about to yield up its glories, there are some few suggestions that have occurred to them—a new erection or a border to make, or perhaps a group of Scotch firs interspersed with silver birch, or a mass of oaks, or some shelter to plant—and so we have a field day and set them out. If the alterations are likely to interfere with the general plan, then there has to be a readjustment of the complete scheme and a careful balancing-up of all the other features. This principle of having a proper plan to formulate and notify everything upon is, I would state, and even reiterate, absolutely imperative, and what may be called the policy of centralization. If you draw from any point, either within or without a circle to its centre, says Euclid, none of the lines can possibly clash; but if you have not a centre to work to, or from, you have all kinds of tangential intersections and clashings. Do not fear to go to a little extra trouble in establishing your foundations is the counsel of every wise builder, and a little wordiness lavished in pleading the need of this essential is not, I am sure, wasted. You will never regret it—at any rate I never knew anyone who did. I have known scores who have

regretted starting on the rule-of-thumb principle without a preliminary plan and survey, or who have discarded it in a large measure, and have not taken the precaution to note their deviations thereon, to their sorrow.

Someone may say, "Yes, that is all right in a large garden or an estate; but in smaller gardens I do not see the need of a plan." I was recently called in to adjudicate upon a number of garden designs for a tradesman's plot of some 60 feet by about 200 feet for the garden city of Letchworth, and I think, my friend, your objection to maintaining a plan policy even on a small plot would have been silenced had you seen the variety of ways and the number of workable features and departments which could be accommodated; some of them needed to be adjusted to a few inches in order not to trespass upon the space for tennis lawn or cartway. One or two of the competitors showed a genius for fine measurements and an ingenuity in planning such as few architects are called upon to exercise, even in the arrangement of the rooms of a house.

Artists and people of ideas always bring them to the one who can make the most of them, and that is the man of system. He can arrange them in such a way that one person's output will enhance and increase the value of the other. The man of system can usually buy up the artistic man's ideas at his own, not the artist's, price, and can sell them for himself at the artist's valuation, and accordingly he makes a good profit out of them. I do not intend to be hard upon the artist, because usually if his work is arranged in its proper niche or rightly understood he may realize for himself something of its true value. In all these matters there is the systematized part and the artistic, and you cannot afford to dispense with either. System or order gains the first place.

In one of the affiliated branches of design, the planning of cities, we are being rather overdone with the systematized propagandists, and there is need to remind people that system will never make a beautiful city. It will secure, or ought in large measure to secure, a healthy city, which is a weightier consideration than the artistic; but, as I pointed out to an American friend, a citizen of Baltimore, you may commendably replace slums with wide, spacious streets, with long, straight avenues and imposing buildings, but there is a dreary sense of sameness about them which after half-a-day palls upon you, as may be experienced in a good many American and Continental cities and in most of our well-laid-out seaside resorts. The artistic or the accidental side, which is always on the lookout for unlooked-for groupings and picturesque combinations, is neglected. This, I may say, is the making of the interesting part of London and the most of our old cathedral cities, such as York, Chester, and Durham. Where would you be able to look in a modern planned city for such a picturesque combination of lake, foliage, and buildings as the view from the sheet of water fronting Buckingham Palace looking towards the Home Office and Government buildings, the lovely groupings of trees reflected in the water and a background of buildings with falling and rising roofs and turrets, somewhat softened by the distance, peering above, broken here and there with the tall forms of the elms in the middle distance.

In laying special stress on the need for a coherent plan I have no wish to run the cart on one wheel, but to keep it duly balanced. Only

I give the systematized the preference and let the picturesque be secondary.

I was reading an article on estate afforestation and outlying plantations a short time ago by Mr. Nesbit, and he laid special stress upon the systematized principle, and advocated that a plantation plan should be kept on all estates along with a tree-book giving broadly the numbers and ages of trees in each plantation; or, if a forest or wood, to denote the broad divisions marked by streams or paths which could be altered and noted in the office according to successive fellings or plantings. What I say to one I say to all who have to do with estates or anything: Have a centralized principle or plan; it will spare you many a needless journey and many a wet jacket. You will be able to set out to adjust in the comfort of your office what almost always has to be done at an inopportune time in the stress of other work.

I take it for granted that we are agreed as to the necessity of a well-thought-out, coherent plan, and that the artistic aid is imperative; we have got all in order and we need to put a match to the pile and get it aflame; and, although it is a peep behind the scenes, now are needed qualities which all do not possess. A plan and sketches at the very best are only indeterminate methods of showing your proposals, and what is needed now is that the garden designer must be a veritable Joan of Arc to infect and inspire others with the ideas which he prepossesses himself, and with the enthusiasm needed to fire them. This may seem a minor qualification; yet you must have the absolute conviction of the soundness of your proposals. Many a man has absolute sincerity in his proposals and can successfully carry them out, yet is all temerity as to backing them. You must also be able to carry the same conviction to others and get them to see things from the same point of view and with something of your own enthusiasm. It is not enough to be able to know how to design consummately and artistically, to get the right trees into the right places, or arrange effective groups or beautiful colour schemes of flowers, or how to secure comfort and brightness, and to understand your soil and locality; but you must have a grasp of men and be able to get the right men into the right places. There are many men who can do a little well, but cannot grasp the whole; some who with an eye for detail can plant our trees and shrubs with splendid results; when you have set them out in mass, others follow and can plant flowers tellingly, but you must know how to fit each specialist into his place.

A head gardener is usually a most observant man, adept at the handling of men, and often knows as the result of many practical experiments the most effective groupings of flowers and plants, and could give most mere book writers a good many points about arranging colour in borders and so forth, and impart what is often neglected, the best methods of growing them; he can also give the garden designer practical information needed for the special locality (if only you can get him to sell his birthright); but notwithstanding this, garden design is not a matter of horticulture. Nor with our present knowledge can it be left to the sphere and domain of the architect. Speaking from a wide knowledge of the subject I do not know which I should prefer, the gardener's superabundance of cultural surprises (for some gardeners can

make the unlikeliest plants grow almost anywhere) or the architect's bald insipidities.

I once reviewed the gardener's standpoint and the designer's as follows, and I am assured it is about right: the designer's ideal is the cloistered garden of meditation and reflection wherein he wishes to be weaned from all outside; where in a kind of rapture undisturbed he may rest deep-hidden among avenues and glades, surrounded with felicitous groupings of gay flowers and abundant fruitfulness, all shaped and beautified according to his inner consciousness. His line of thought leans more, perhaps, to the realm of picture and imagination, yet now and again it is given us to view that ideal combination of forms, features, and images, for "truth is stranger than fiction." As I said in my last lecture the designer is always being beaten in wrestling to achieve the attainment, yet he clingingly cherishes the ideal. This is the objective or the designer's side, and I pity the man that has not such a vein in his soul.

In contrast is the subjective or the gardener's practical side. He must be ever intent upon improving what is, who finds all the forces with which he has to contend bristling with life. An overlay or a little abstraction may cost him dearly. If he is not up and doing betimes when Nature calls for pruning, thinning, trimming, or his correcting, controlling hand, there has to be an increased strain or disaster. Even in winter, the time when the forces which need his energies are in comparative rest, he has to be like a capable general amassing his stores to cope with the forthcoming multitudinous outburst of living energy on all hands and sides. There is no rest or reflection for him. It is "touch-and-go" almost the whole year round; alert, immediate, and prompt he must be. If he is not so he wakes up some morning to find all mixed and scattered and mystified. This is what I may call the subjective or the practical side of gardenage.

I am not going to waste much time upon the feud of formal and informal, or the natural disposal of land. We cannot now make a garden of Eden, where the clime was so favourable that the ground upon which there was no rain supplied all that was needed for the comfort and luxurious ease of our first parents. The weather that we have been experiencing during the last few weeks would drive even a camper-out indoors, much more those who would sleep under the dome of the heavens. We have to begin with the practical problem of a covert from the elements, in other words a house; moreover, the exigencies of life in and about that home are such that one cannot always, even in a garden, afford time to go the furthest way round for the nearest. It is very entertaining to be sent round by Kew to get to Hampstead, but we have not always time, even if there is a promise of tea in a neat tea-house on the way; and so, in the main, we come to make, almost always, straight paths for our feet instead of crooked ones. These the man who reckons to hold a brief for Nature scorns, and thunders down upon us, furious in his wrath. If, on the other hand, it is pleasingly suggestive to turn a path round a knoll or to run it effectively between planted banks, or even a drive at times, so that it adds to the pleasure of the home to see the nicely equipped horses emerge from a little woodland and spin round towards the house in a graceful sweep, so much the better; do so, and if it

is possible to produce similar sensations likewise in the freer parts of the ground which are devoted to strolling and meandering, let us by all means do so with all the skill possible, and without straining the effect. Everything after its kind was a rule in the beginning; and when from necessity we must have a house, remembering that the house is, and must be, in its main lines formal, it is fitting that the house should in the majority of instances long for companionship after its kind in the garden, and desire to have some circumscribed area commensurate with its size and a complement to its plan. This is both rational and logical; therefore I make no apology for the terrace and its usual formal arrangement; nor do I quarrel with, but rather commend, the man who is a strict purist in this formal domain and keeps his plants subordinate. If the tallness in the lines of the design of the house seems to demand a herbaceous border to cut down its seeming tallness, then by all means have one right under the windows, with hollyhocks and sunflowers and tall shrubs. There is no danger, only the danger of laying down hard-and-fast lines.

We will suppose now that we have a proper survey and sections giving the boundaries of the garden or estate before us; the first question is the amount of money to be devoted to the garden. I need not trouble you much with this most practical consideration. The question which is immediately related to it, and which I find is equally important, namely, the amount to be devoted to the annual upkeep of the garden, will perhaps be of greater interest to you than the former one, namely, the amount to be expended upon the lay-out. In many, many new gardens I am met by my client with woeful tales that the extras on the house have run to such an inordinate amount, it is imperative that as little as possible be expended upon the gardens. This is almost always tantamount to saying that he wishes a good show in the garden for a little money. Well, as most gardeners know, this is not a difficult achievement provided there is a good productive soil to start with, which is not always, indeed, not often, the case. You can buy flowers and shrubs, plant them, and for a few years they will make a passable show; but if the ground has not been suitably enriched, and all deeply dug and furnished from the foundations with a view to continuity, well we know what happens.

The first step before launching upon anything is to honestly tell a client what the ruinous policy of skimping in the garden formation means, and to point out clearly from the first what amount in yearly upkeep a proper garden will need, of such and such dimensions, which every man who has experience in garden design could sketch out in a few minutes on a plan with its shrubberies, glasshouses, kitchen garden, terraces, lawns, and sundry departments. In passing, let me commend the smaller though self-made garden, amply staffed, in preference to the more extended garden inefficiently equipped and sparsely formed. Hear what an American garden authority says about our English gardens: "It is characteristic of the Englishman that, enumerating the things which require consideration when planning the grounds, he names economy first. This to them is a matter of great importance, and to its just consideration is due, to a large extent, the number and beauty of the English gardens. As a rule, work is not laid out or undertaken which cannot be easily executed and maintained without taxing the resources of the owner.

With them gardening is so old an art that the cost of maintaining can be as readily estimated beforehand as can the execution. If a man can afford but three servants his house is arranged on the basis of what three servants can do thoroughly well, and he will not have a larger house unless he can afford to have his service adequate. His stable will be regulated with equal care. He will have only such horses and carriages as can be kept in first-rate condition. Applying these principles to the garden, collecting and making use of the cumulative experience of many generations of gardeners, he lays out his ground with clear foresight as to its maintenance. Nothing is to be slovenly, nothing neglected. The results amply justify this course. The thoroughness of the English garden is the very root of its charm."

In actual practice I strongly advise that before a single sod is turned for the house the client, architect, and landscape gardener should visit the site together. There are so many considerations that have to be taken into account, which the man who has only the house before his mind's eye is not alert to, that it is at the least diplomatic to have all the many-sided considerations thrashed out. Another point which hinges upon the above is that there is often a very great waste of good surface soil when the house excavation is left to the building fraternity.

All this is preparatory to a wisely directed start, and now for a commencement upon the design, we agreeing for our present purpose that these considerations have been weighed and that time has been taken by the forelock.

After the architect has produced his plan and design for the house, the first thing, after providing our coherent garden scheme or policy, securing directness and comfort with pleasure, is to see to shelter and balance by forest trees. This, the arboricultural factor, counts greatest in maintaining within the garden the sense of continuity and harmony with the broader landscape without. The modern day trend in architecture is opposed to the older method of balancing the elevations by exact symmetry, that is, by each feature being exactly reproduced on the other side of the building; and so it comes about that balance has to be obtained mostly by groups of forest trees; shrubs are little or no good here. If there are unsightly surroundings we need tall trees or evergreen firs to aid us; and if the ugliness to be blocked out takes the shape of insistent tall chimneys the height of these plantations has to be increased by raising mounds of earth to plant them upon. The client who can make up his mind to do the greater part of the plantations before the other work is like a wise general who looks after his scouts and outposts. To gain a year or more in the planting is a wise foresight.

By this time we are fairly launched upon the flowing tide of execution, earth removal; the pond or lake is in course of excavation; the terraces are being built or formed; all the valuable surface soil has been stored in a wisely chosen place, where it will not have to be removed until it is placed topmost again, and here your plan stands you in good stead; and as all gradually begins to assume shape your client's brow unknits and you note his pleasure in viewing each departmental portion of terraces, lawns, the drive, walks, lake, kitchen garden, orchard, fruit or reserve garden, with its usual attendant glasshouses and frames, and wild garden, emerge

from chaos and assume shape and form. The glasshouses comprise vineries, peach and fruit houses. Propagating houses and conservatory in a large garden may well be described as a department in itself, but I am compelled to generalize to a great extent. There is need of close inspection during the progress of this work to see that the terraces are properly rammed, that the drives get their specified depth of pitching and metalling. It is a good plan to keep off the gravel until the very last, and then in a good job it ought to be delightfully coloured Breendon or some setting gravel which needs to be rolled in with water; reject gritty, teeth-grinding, flinty gravels. The close inspection needs also to be exercised towards all constructive work to see that it is sound and good, that the kitchen garden is deeply trenched, the soil properly enriched with manure and leaf soil, if procurable, with every bit of its own surface tilth and that which can be got from elsewhere put on the top. This surface soil is worth three times its weight in manure. The fruit borders should be formed with the proper parts of lime and all well drained, and also the vine and peach borders. Keep a sharp look out on the building, pointing and coping of the kitchen garden walls, where bad cement and lime, leaving holes as lodging places for insects' nests, spell despair almost to the poor gardener. If our reputation is to be maintained, at this stage at all costs, all jerry men and skimpers must be despatched ruthlessly. It is, I say, the height of folly for a client to be stingy in his garden. Far better, I repeat, do a little well and gradually accomplish the ultimate, season by season, with thoroughness stamped upon each part.

When all is shaped and formed and the lawns made, comes the question of adornment, and whatever else can be done from plans with our feet on the fender, this cannot. Now our place is in the fresh air, as in the sunlight the garden itself almost speaks, yet how easily stillness and stolidity begin to make themselves apparent. If you do not tackle this work in the happy mood, working with straight aim, simplicity, and precision, the result of that riper judgment of fine and sympathetic thought, you cannot get that feeling of jaunty ease into the disposal of your ornamental plantations and borders. The vistas and glades seem to be stereotyped, the angularities of the house appear harsher even though climber clad, and the terrace wall more insistent than ever. Anyone, almost, can tell when the ornamental planting has been done by a novice; but there are few, myself included, that can make any appreciable alterations in it when it is clumsily disposed. As to this difficult part of the work I am often pretty much like the lad who said, "If it hits it hits, but if it doesn't, well then we must make the best of it." If it doesn't hit I will make a confession such as I once heard made by a famous orator who said that if his theme didn't go off he always had a few reliable stock side-issues whereby to cover his retreat; and so it is with most of us garden designers, we always have a few never-failing devices to raise the adornment of the garden out of mediocrity. Some people prefer the makeshift, but we bewail that here at least that subtle suggestiveness which ministers to the reflective garden enjoyer has eluded us, so we pass on to the next caravan and begin again, adding just this reminder: Your planting must be made once for all. "Most of the plants in the border can be divided when they grow too quick and the soil redug and enriched,

but shrubs to thrive must be left alone." The planting of flowering shrubs is a vast subject, and can only be outlined here; even if a whole lecture were devoted to it, it would be impossible to do justice to it. I have no hesitation in saying that, after allowing for various tastes, the numbers of wooden, cast-ironified attempts that one meets with are distressing.

The three remaining items are the planting of the borders, the planting of the kitchen garden, and the finishing touches. I will say little or nothing about planting the kitchen garden. Not that it is unimportant. It is an important item to get the right fruits and the right varieties of fruit on each differing aspect of wall, and along the espaliers; but as the great bulk of my readers are practical horticulturists I could, I feel sure, profit more by a conversation with or lecture from you than you could from me. Before the kitchen garden is planted the head gardener is on the scene, and as his merits have to be judged in a great measure according to its produce I usually work hand-in-hand with him.

It matters little how formal the filling of your beds on the terrace is, being immediately under the windows of the house, or if you are minded to do a little carpet bedding (let us hope not much on the score of expense) I will not quarrel with it; I think it is a good deal more appropriate than straggling and gaudy begonias. Try as you will, everything within the square-walled rooms of the house is formal, and everything in the dress and manner of the occupants is on formal though not necessarily stiff lines.

As to the borders beyond the terraces, I need not say to practical men that, viewed both from the artistic as well as the practical standpoint, the character of the background in each case alters our plans. Whether the flowers are to be seen against hedges is another consideration that determines much, as also which of the several differing kinds of hedges are to be our background, concluding, of course, that their roots are restrained by some device from sapping the flower's domain. Time would fail to enter into the unlimited groupings and the changes that are at our disposal; in fact, we are always improving and moving in the borders if alert, and constantly meeting with new yet old surprises. If a client demands a goodly display from the first—which I do not often advise—then I have a proper border planting plan prepared with good clumps of herbaceous stuff, selecting fixed positions for such plants as Martagon lilies, which resent moving during the triennial lifting, digging, and enriching. But the method I advise is not to plant too thickly in the first year; and, as no one can well lay down a rule for a locality, see what plants thrive best and tend to the happiest local groupings. Any unoccupied place can easily be filled by annuals and biennials.

The final visit is to give the few happy balancing touches here and there. It means perhaps, the insertion of a clipped tree or two or three formally kept hollies on the terrace, a few roses, a touch of statuary, animated or reposeful (again a most difficult task to hit the right note), and the right size and proper height of the pedestal, a climber or so, some architectural feature which is obtrusive and hitherto unnoticed to be masked, perhaps an archway of yew or of roses on a framework; then you must leave the work of your hands for others to make or mar.

I know some will be disappointed that I have not gone more fully into detail and into the names of trees and plants for special uses. I have purposely avoided this, and I have taken the course I have in these lectures, first treating of the historical and then the practical side, because the bent of horticultural men is to make light of the traditions of a place, and because in all of us in carrying out the work entrusted to us there exists a tendency to lose the very spirit and character of the work and get encumbered in details.

THE INFLUENCE OF GEOLOGY ON HORTICULTURE.

By CECIL H. HOOPER, M.R.A.C., Agricultural College, Wyo, Kent.

[Lecture delivered October 13, 1908.]

IN dealing with the relation which exists between geology and horticulture, we have to pass by the fascinating story of the earth's former inhabitants as told by the fossils in the rocks, as well as the minute subdivisions of the more important strata, and consider the surface



FIG 73.—ROCK, SUBSOIL, AND SOIL.
(From "The Soil," by A. D. Hall, M.A.)

geology, dealing more with the beds which have a wide superficial area and which are of importance to agriculture and horticulture than with those which are most interesting to the geologist on account of the large number of fossils contained in them.

The gardener regards the earth's surface as "soil." He classifies soils according to the substances which predominate in them, such as sand, clay, lime (derived from limestone or chalk), or vegetable matter.

Professor J. Wrightson suggests dividing soils into—

1. Clays.
2. Clay loams.
3. Loams: easily worked soils, such as friable garden soils.

4. Sandy loams.
5. Sands.
6. Marly soils.
7. Calcareous soils.
8. Vegetable moulds.

Technically "soil" may be defined as that portion of the earth's crust which man breaks up in the cultivation of crops, while subsoil is the material lying below the soil turned up by the spade or plough, into which the roots of plants penetrate, and extending down to the solid rock, whether it be hard as granite or soft as clay (fig. 73). The character of the soil is largely dependent on the subsoil.

The earthy matter of soils has been produced by the gradual crumbling down of previously existing rocks, through the action of water, frost, change of temperature, and vegetation. The decay of vegetation itself produces acids which decompose rock.

The work of earthworms is also of importance in mixing, grinding up the soil, and letting air into it.

The influence of geology on plants is modified by altitude, rainfall, natural drainage, proximity to the sea, &c.; thus we have a special flora on high mountains, on marshy land, and in proximity to the sea, to a considerable extent independent of the rock beneath.

TABLE I. INFLUENCE OF RAINFALL AND ALTITUDE UPON VEGETATION.

A Section from Snowden to Essex.

By Professor Primrose McConnell, in his "Elements of Agricultural Geology."

	Merioneth.	Montgomery.	Shropshire.	Worcester.	Warwick.	Northampton.	Bedford.	Herts.	Essex.
Rainfall, inches per annum, approxim.	100	95	45	35	30	27	25	22	20
Height above sea in feet, average	900	700	400	300	270	250	230	220	200
Corn acreage per cent.	11.1	20.3	22.4	26.2	25.7	29.8	42.0	42.3	46.3
Grass acreage per cent.	75.9	63.8	58.2	52.9	56.4	52.8	31.4	29.7	21.2
Geological formation	Primary rocks			Secondary rocks				Tertiary rocks	

TABLE II.—INFLUENCE OF UNDERLYING ROCK ON SURFACE VEGETATION.*

Prepared by the late Professor James Buckman.

Underlying rock.	Apple.	Pear.	Oak.	Elm.	Beech.	Pine.
Old red sandstone	15	8	8	10	0	1
Lias clay	10	3	5	10	0	1
New red sandstone marl	8	0	7	12	0	2
Oxford clay	6	0	10	8	0	1
Oolitic limestone	2	0	1	4	10	5
Chalk	2	0	2	4	8	5
Gault clay	4	1	6	6	0	0
Greensand	8	1	3	7	0	3
Mountain limestone	1	0	2	2	3	1

* The figures represent the relative frequency of the trees growing upon the different formations.

Garden soil is often considerably altered and ameliorated to suit the plants grown ; so it is more upon the deeper-rooting trees and wild plants or weeds that the influence of the surface geology is most noticeable, as is shown in Table II.

Before considering in detail the various strata of rock I propose mentioning some of the plants characteristic of the commoner kinds of soil, grouped into the wider classification of plants of sandy soils, clay, lime, and peaty soils, and those which grow close to the seashore. For this purpose I quote liberally, with Mr. A. D. Hall's permission, from his book on "The Soil."

Plants showing preference to certain Soils.—Mr. Hall tells us that the common primrose is undoubtedly a clay lover, yet it will be found widely distributed over all the English soils ; the beech and the yew are typical trees of the chalk ; good oak and hornbeam of the clay ; Spanish chestnut and many conifers, like Scotch fir, are sand lovers ; yet each of these trees will be found commonly enough on other kinds of soil, though generally thriving best on the soils named.

Most of the leguminous plants like lime, but there are others that are intolerant of lime in the soil, such are lupines, seradella, and gorse ; whilst of grasses, the sweet vernal grass is said to be intolerant of chalk.

Plants of Sandy Soils.—Among plants specially suited to sandy soils may be mentioned potatoes, which require liberal manuring, including potash ; carrots thrive especially well on sandy land with a deep, fine tilth. In Prussia lupines are used in reclaiming sandy land. The Spanish chestnut, birch, holly, and many conifers thrive on sandy land. *Pinus Pinaster* and Spanish chestnut dislike lime. Heather, rhododendron, and azalea are intolerant of lime and are associated with sandy and peaty soils. Gorse, broom, tufted vetch (*Vicia Cracca*), and bird's foot (*Ornithopus*) are characteristic leguminous plants of sandy land. Cranberry, bilberry, foxglove, sheep's sorrel (*Rumex Acetosella*), bracken (*Pteris aquilina*), wavy hair grass (*Aira flexuosa*), spurrey (*Spergula arvensis*), corn marigold (*Chrysanthemum segetum*), long smooth-headed poppy (*Papaver dubium*), and blue cornflower (*Centaurea Cyanus*) are characteristic plants of sandy soils.

Plants characteristic of Clay.—On some clays of close texture the grass is poor and surface rooting. Stoloniferous grasses, like marsh bent grass (*Agrostis stolonifera*) prevail ; on the poorer pastures the spiny form of rest-harrow (*Ononis arvensis*) grows, along with wild teasel (*Dipsacus sylvestris*), corn crowfoot (*Ranunculus arvensis*), dyer's green-weed (*Genista tinctoria*), all characteristic and often troublesome weeds ; on cultivated land the black-bent or slender foxtail (*Alopecurus agrestis*) and corn mint (*Mentha arvensis*) are difficult to deal with. Many clays are deficient in phosphoric acid, though containing sufficient potash, and are benefited by the application of basic slag or superphosphate.

Plants characteristic of Calcareous Soils.—Calcareous soils are generally warm and dry, and when deep, extremely fertile. The thinner soils are rather subject to certain insect pests, like turnip flea. Calcareous soils, many of them, need vegetable matter and are greatly benefited by farm-

yard manure, the ploughing in of green crops, and sheep folding. Superphosphate is a good form of phosphatic manure; potash is generally needed. Salt is generally beneficial as an addition to manures on calcareous rocks, especially for plants of the cabbage tribe. The lighter calcareous soils are notoriously weedy; fumitory (*Fumaria officinalis*), dove's foot and crane's bill are characteristic weeds. Sainfoin and lucerne flourish and provide abundant and valuable fodder even on the driest chalk soils.

The natural flora of the calcareous soils includes the beech, yew, wild cherry, juniper, box, mealy guelder rose (*Viburnum Lantana*), beam tree (*Pyrus Aria*), dogwood (*Cornus sanguinea*), and traveller's joy (*Clematis vitalba*). It is rich in flowering plants, including the horse-shoe vetch (*Hippocrepis comosa*), bird's foot trefoil (*Lotus corniculatus*), kidney vetch (*Anthyllis Vulneraria*), milkwort (*Polygala* sp.), bladder campion (*Silene inflata*), burnet (*Poterium Sanguisorba*), wild parsnip (*Pastinaca sativa*), sheep's scabious (*Scabiosa Columbaria*), common succory or chicory (*Cichorium Intybus*), and viper's bugloss (*Echium vulgare*), marjoram (*Origanum vulgare*), which are characteristic of the pastures and waste places on chalk and limestone. Among the grasses, the downy and yellow oat grasses (*Avena pubescens* and *A. flavescens*), upright brome (*Bromus erectus*), and heath false brome (*Brachypodium pinnatum*) are common.

Plants characteristic of Loams.—Of plants indicating a good fertile soil may be mentioned chickweed (*Stellaria media*), groundsel (*Senecio vulgaris*), fat hen (*Chenopodium album*), sow thistle (*Scnchus oleraceus*), goose grass (*Galium Aparine*), speedwells (*Veronica agrestis*, &c.), pimpernel (*Anagallis arvensis*), henbit (*Lamium amplexicaule*), wild poppy (*Papaver Rhoeas*), the small spurge (*Euphorbia Peplus*), strong-growing stinging nettles, tall thistles, and sturdy hedgerow timber.

Plants of Peaty Soils.—Conifers, heather, *Sphagnum*, sheep's sorrel, louse-wort, sedges, rushes, and sundew are characteristic of peaty soils. The first steps towards improving these soils are to drain them and then to apply lime.

Plants tolerant of Salt.—Mangels, asparagus, cabbage, seakale, common thrift or sea pink, and the sea aster tolerate salt soils, but thrive well in ordinary soil. The orache, beet, sea lavender, sea heath, seakale, and samphire are found in salt marshes.

Plants intolerant of Salt, even in small proportions, include the rose, orchid and heath families, and stinging nettle.

Plants that generally grow on Land that requires Drainage include coltsfoot, *Equisetum*, cuckoo flower, water mint, sedges and rushes.

The geologist classifies rocks into

- I. *Igneous*—such as granite and trap.
- II. *Sedimentary* or *Stratified*—such as clay, shale, sandstone, limestone, and chalk, deposited in the sea or in fresh water.
- III. *Terrestrial*—due to the growth of vegetation on the land, such as coal and peat.

The *Stratified rocks* are divided into three periods, based on the animals and plants found as fossils in them; thus—*The Primary*, or

oldest, containing earth's first preserved creation, all, with the exception of *Lingula* and *Nautilus*, which persist to the present day, extinct species, often very unlike those now existing, but, we believe, well adapted to their environment. The *Secondary strata* contain no animal remains which can be identified with existing species; those which are found in them are nearly all different from those which occur either in the Tertiary above or the Primary strata below. The *Tertiary strata* are characterized by containing, among other fossils, the remains of animals which are identical with existing species. England has been called "the Paradise of the geologist," because, coming from the oldest rocks in the West to the youngest in the East, it contains examples of nearly all the beds of rock which exist in any part of the world.

Stratified rocks consist of repeated alternations of limestone, sandstone, and clay, or mixtures of two or more of these earthy substances. The mixing largely modifies the character and often improves the fertility; thus chalk mixed with clay produces a better soil than either the chalk or the clay unmixed, as the one supplies what the other lacks. Again, where a sandstone meets a limestone, the sandy soil is benefited

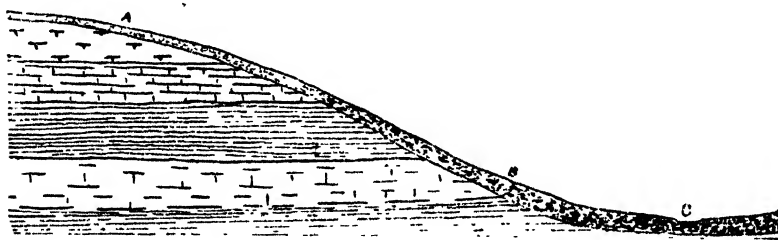


FIG. 74.—DIAGRAM SHOWING INFLUENCE OF INCLINE ON FERTILITY.

(From "Agricultural Geology," by Primrose McConnell, B.Sc.)

by the addition of lime. The same happens when clay or marl is added to sandy soil; both the sand and the clay are improved by mixing. Owing in some places to glaciers and icebergs in bygone ages, rocks, gravel, sand and clay have been transported from their original home and carried and deposited elsewhere. Where this drift or transported matter is deposited, it alters the character of the soil from that in the neighbourhood lying over the same strata, as the soil is more dependent on the character of this transported material on the surface than on that of the rock below. The height above the sea, the mean temperature, the quantity of rainfall, whether hilly or flat (fig. 74), and even aspect, all somewhat modify the soil and its fertility, even when overlying the same rock; nevertheless, allowing for the modification, the same rock produces a similar class of soil all the world over.

Igneous Rocks.—Starting with the igneous or fire-formed rocks, we will first consider *granite*, of which the characteristic minerals are quartz and felspar, with mica in lesser proportion. These, when decomposed, yield sand, alumina, and potash. The quality of the soil is dependent largely on position. Where mountainous or forming steep hills, as is the case in most of the granite districts in Cornwall and Devonshire, it is

covered with heath, coarse grass, and peat, as on Dartmoor, forming either a bare sandy soil or a cold, stiff, and wet clay. Where, however, the elevation is less and the climate drier, as at Moreton Hampstead, on the eastern side of Dartmoor, the soil improves, forming useful pastures and arable land from which the potatoes sold in Exeter market are obtained; on the west of Dartmoor there is also fine pasture letting at 60s. per acre. The soil of the Scilly Isles is good and largely used for daffodil growing; this soil is derived from a granite which, in addition to quartz, felspar, and mica, contains hornblende, which, on decomposition, yields lime, magnesia, and oxide of iron.

Volcanic Rocks include the greenstone, basalt, serpentine and syenite, and these, when disintegrated, usually form good soils. These rocks occur as serpentine in the neighbourhood of the Lizard, in Cornwall, where they give rise to soils of an inferior quality owing to the amount of magnesia, but hornblende rock in the same district yields an extremely fertile soil; as greenstone in Charnwood Forest; as syenite at Mount Sorrel and in the Malvern Hills; as porphyry in the Cheviot Hills, Cumberland, Anglesea, and Carnarvon.

The lowest of the primary rocks are the *Cambrian* and *Silurian*; these come to the surface over a large portion of Wales, both in the north and the centre, and in the Lake District in parts of Cumberland, Westmoreland, and Lancashire.

The Cambrian Rocks, in the West of Wales and Cumberland, occur chiefly in mountainous districts. The rock is largely of a slaty description, weathering slowly into poor thin soil or cold clay, covered chiefly by heath and bog. The soils are very deficient in lime.

The Silurian formation comes to the surface in Denbigh, Montgomery, and Radnor, and skirts the south and east of Carmarthen, the north of Hereford, and the south of Shropshire. Much of this formation consists of deep beds of sandstone and shale, the former covered with heath, the latter producing cold muddy clays. The Llandeilo Flags, which contain lime, form a fertile arable soil in the south of Carmarthen, especially on the banks of the Towy. This is also the case in Herefordshire and Shropshire, where the Aymestry and Wenlock limestones, mingling with the rocks below and above, produce fertile soil.

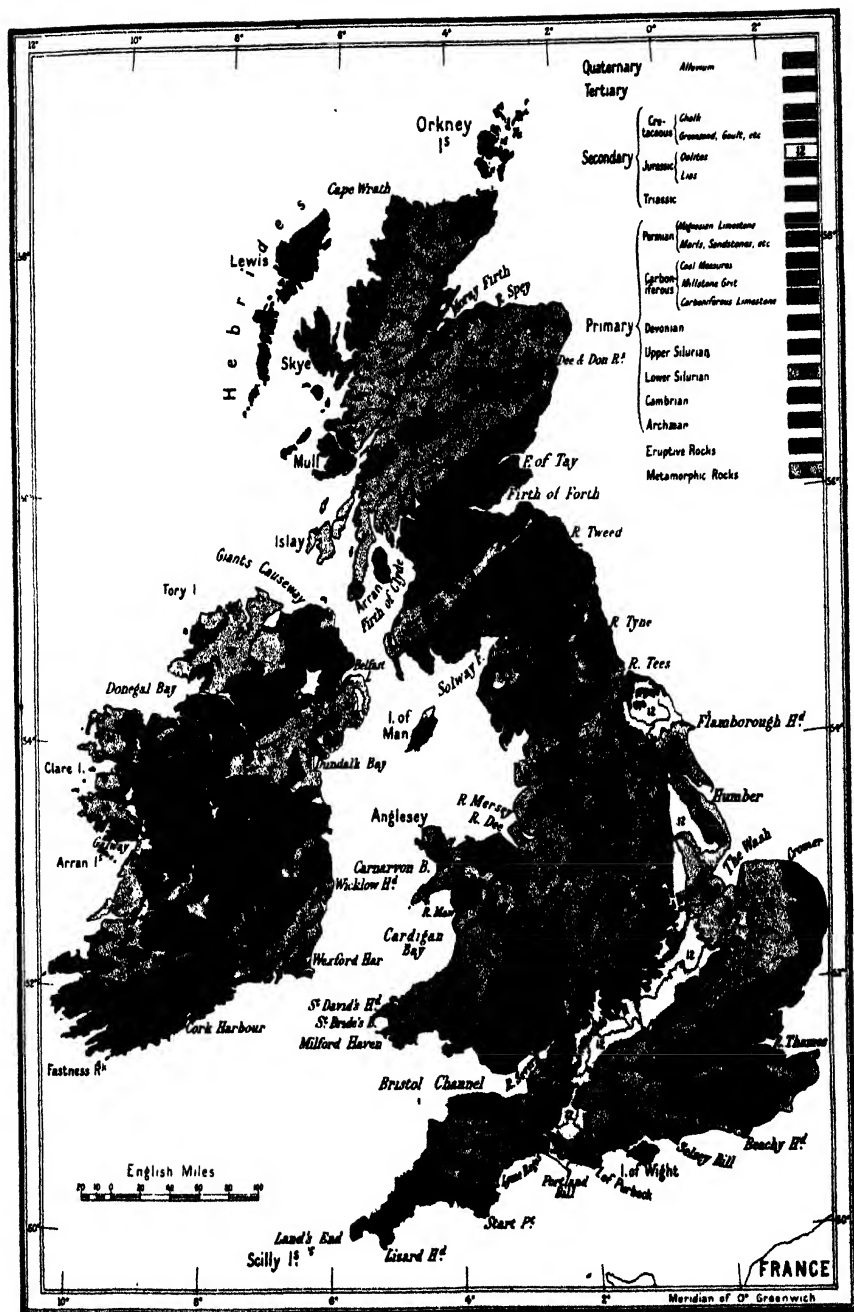
The Old Red Sandstone is ever associated with Hugh Miller, the Cromarty stonemason, who became one of the greatest of geologists, notable for careful observation and poetic description. This formation, though occasionally of vast thickness, estimated at varying between 500 and 10,000 feet thick, does not occupy a very extensive area at the surface. It consists of red sandstones and marls. These rocks form a portion of Pembroke and Carmarthen, the greater part of Brecon and Hereford, and parts of Monmouth and Glamorgan; and the north and south of Devon and much of Cornwall rests on this formation. The upper and lower beds often produce hungry, barren, sandy soils, but the middle beds in Hereford, South Devon, and parts of Cornwall produce excellent land, as they contain more clay and lime. Tenbury, in Worcestershire, noted for its cherries, stands where the Old Red Sandstone is mixed with alluvial deposit.

Sir Roderick Murchison wrote of this formation:—"The most loamy

of the red soils of Hereford afford the finest crops of wheat and hops, and bear the most prolific apple and pear trees, while the whole region (eminently in the heavier clayey tracts) is renowned for the production of the sturdiest oaks, which so abound as to be styled 'the Weeds of Herefordshire.' " Orchards are to be seen on this formation in almost all parts of Herefordshire. A recent estimate gives the value of apples in Herefordshire as £600,000; this is largely cider fruit, though recently more dessert and cooking fruit has been planted. The apples of Herefordshire are in general well coloured, and when well sorted and properly packed are valued in the market. Probably in no part of England are there such large pear and apple trees. Lining is of great benefit to this soil, especially to the strong clay loam near Hereford. Some of the best recently planted orchards in Herefordshire may be seen at Ross, Credenhill, and Withington. Devonshire has a large acreage of cider apple orchards; much is old and neglected, though picturesque, but producing good fruit where well cared for; nearly every farm has its own orchard, but this is growing less usual than formerly, and many orchards are gradually ceasing to exist. The orchards are fairly evenly distributed throughout the county, but there are none on granite, and comparatively few on the millstone grit. The apples thrive best on the sandstone. The Staverton district, near Totnes, is especially noted for its cider. There is but little small fruit grown except on Lord Mount Edgcumbe's estate around Bere Alston and Callington, on the banks of the River Tamar, one side being Devon, the other Cornwall; early strawberries are grown on land sloping southwards, and raspberries and bush fruit are grown by the tenants under a liberal system of compensation. The famous potato land of Dunbar is over this formation.

The Lower Carboniferous rocks include the slate grits, the carboniferous limestone, and the millstone grits. In North Devon calcareous sand from the seashore used to be carted on to the sandy soil for several miles from the shore, as it was found to be so beneficial, the soil being deficient in lime. The slaty soils of Cornwall, especially in the mining districts, are mostly poor, and large portions of the county remain unenclosed, with a scanty covering of heath and poor grass. At Penzance the land is very fertile, probably due to admixture with basaltic rock, and lets at as much as £8, £10, and even £12 per acre.

Carboniferous or Mountain Limestone, with a thickness varying from 500 to 5,000 feet, extends over the greater part of Derby and Northumberland, stretching along the west of Durham and Yorkshire to Preston in Lancashire, and forms the greater part of the Pennine Hills and of the Mendip Hills in Somerset; there are also small areas in Gloucestershire and Wales. It is generally a hard blue limestone, more or less full of fossils, separated here and there by layers of sandstone, sandy slates, or bluish-black shales, like those of the coal measures. Owing to slowness in decomposition and high elevation the soil is in many parts bare rock: in Northumberland it is still chiefly moorland; in other parts it produces naturally a short, sweet herbage. Sheep's fescue is a prominent grass in these pastures. At Alnwick (Northumberland) strawberries are successfully and extensively grown; there are large numbers of apple trees in the market gardens.



GEOLOGICAL MAP OF BRITISH ISLES.

Stanford's Geog. Estab: London.

(To face p. 400.)

At Hexham (Northumberland), in the valley of the Tyne, the Hesse pear and the damson thrive over an alluvial, gravelly subsoil some 12 or 14 feet deep over the carboniferous rock.

Millstone Grit has a thickness of some 600 feet. It shows itself in Northumberland, Durham, Yorkshire, Lancashire, Derbyshire, the northern half of Devon, and part of Cornwall, and skirts the coalfield of South Wales; it lies next below the coalfields. The soil resting on it is characteristically poor; and is in some parts covered with peat moss.

In the North of England the sandstone is fine in texture, the grains of sand being small, with minute plates of mica; in other parts the stone is of a coarse texture, consisting of grains of sand of the size of mustard seed, held so closely together by a clayey cement as to resist the effects of the atmosphere and to form one of the strongest and most durable stones for building. The surface of this formation is usually hilly or mountainous, and a much greater extent is covered by moor and peaty swamps than is the case with any other formation in England. The soil improves where it meets other rocks rich in clay and lime. The Morpeth market-garden district is situated where this formation meets the mountain limestone or Yoredale rocks on the north and the coal measures on the south. The 'Whinham's Industry' gooseberry originated here. The apple thrives here better than in the Tyne Valley.

The Coal Measures, estimated at 800 to 3,000 feet thick, consist of alternate beds of grey sandstone, dark blue shale or hardened clay, interstratified with beds of coal, usually with an undulating but seldom hilly surface. The larger coalfields are those of Northumberland, Durham, York and Derby in the north; of Stafford, Leicester and Warwick in the centre; of Gloucester, Somerset, and South Wales in the south. The coal formation generally produces very inferior agricultural land, much of the soil being a yellowish clay, wet, poor, and cold, producing naturally very bad herbage, principally composed of heath and 'carnation grass'; the soil, however, is improved by drainage and liming where this is practicable. In Somerset and Gloucester the coal measures are covered with a reddish sandy clay, which produces a good friable soil.

The Permian Rocks include the *Magnesian Limestone*, which is a small-grained dolomite 100 to 500 feet in thickness, generally yellow, sometimes grey, exposed in a strip five to ten miles wide, running from the coast of Durham to Nottingham. The soil over it is mostly thin and generally dry, naturally producing a poor, short sheep pasturage, but upon which furze thrives remarkably; as an exception, however, from Staindrop to Darlington, near the River Tees in Durham, is some of the best and richest grazing land in the North of England, probably due to transported soil covering it and improving it. Liquorice is cultivated over this rock at Pontefract in Yorkshire.

Trentham, in Staffordshire, on the Permian red sandstone of this formation, has some good orchards in the neighbourhood, in spite of its nearness to the pottery fumes.

The Triassic, or New Red Sandstone, estimated at 500 feet thick, consists of alternate layers of sand, sandstone, and marl. This formation extends over a larger superficial area than any other geological formation of England—from Torbay in South Devon north-eastwards into Somerset,

from Bristol on both sides of the Severn into the Vale of Gloucester, along the base of the Malvern Hills, north of Worcester, expanding into a gently undulating plain nearly eighty miles broad, including Warwick, Stafford, and most of Leicester, and then branching westwards over Cheshire to West Flint and South-west Lancashire, appearing again in Cumberland in the Vale of the Eden around Carlisle, covered by peat on the Solway Firth and the South-west of Lancashire. The eastern branch includes part of Derbyshire, with gypsum near Trent and Nottingham, through the centre of Yorkshire and the south of Devon to the sea. The Severn, the Trent, and the Mersey all rise in this formation, and their water is "soft" compared with the "hard" water of the Thames. The soils of the old red sandstone and those of the new red sandstone are very similar. In Devon and Somerset the red marly soil is of first quality, whilst in Nottingham (Sherwood Forest) and Yorkshire it forms large sandy tracts, producing scarcely anything but heath, furze, whortleberry, birch, and Scots pine; however, this is a small area compared with the great extent of rich productive soil on this formation, the meadows of which are rich and the arable land productive.

Grass-land in Devon and Somerset often lets at 50s. to 60s. the acre. In Devonshire some of the best-managed orchard districts are on this formation, such as those in the neighbourhood of Ottery St. Mary, Newton St. Cyres, and Crediton. In Somerset there are numerous orchards between Wellington, Taunton, and Watchet on the sandstone and marls of this formation. Arable land in the Vale of Taunton often lets at 45s. to 50s. per acre. Here the Lias and red sandstone adjoin the former, covered by good old grass; on the latter the arable land produces some of the most luxuriant crops in the kingdom. Lime is the manure chiefly required. At Axbridge and Cheddar rich loamy land sloping south used to be let at £4 to £8 per acre for early potato growing. Strawberries are grown for market near the Cheddar cliffs and caves. At Easton, near Bristol, there is a fine sandy loam let at £6 to £8 per acre for market gardening. This formation occupies a large part of Worcestershire, where the soil exhibits all gradations of texture—stiff clay, marl, strong loam, sandy loam, and blowing sand. The orchards are numerous on this formation in Gloucester and Worcester, as well as Devon and Somerset; in Staffordshire there are old-established orchards of apples and damsons in the neighbourhood of Rocester, on the River Dove, and at Eccleshall, in the west of the county. Around Lichfield, on the borders of the Trent, market gardening is largely carried on. Shropshire does not produce much fruit besides damsons. Cheshire is noted for its rich meadows; it was on these pastures that crushed bones were first extensively used with great advantage to the grass. Near the River Dee a considerable acreage of strawberries is grown, and these are ready to pick a week or so later than those of Kent. Near Redditch, in Worcestershire, considerable quantities of apples, pears, and hops are grown. In Leicestershire, in the neighbourhood of Syston, on the marls of this formation, a most excellent cooking plum, 'Syston Native,' does well. As is the case with the 'Persnore' plum, it grows on its own roots without budding or grafting. The 'Lord Suffield' apple, also, thrives here without cankering. The principal fruit-growing districts in the county are comprised

in the valleys of the rivers Soar and Wreake. Small fruits, particularly strawberries, are well grown in the neighbourhood of Leicester. In Nottinghamshire good orchards are seen on the marls of this formation in the neighbourhood of Tuxford, of Southwell (the home of 'Bramley's Seedling Apple'), of Halam (the birthplace of Mr. Bradley, who raised two most valuable varieties of strawberries, 'Sir Joseph Paxton' and 'Dr. Hogg'), also at Edwalton and Ruddington, near Nottingham, and at Chilwell, where there is an orchard of over 100 acres of standard trees in grass, some of the pear and apple trees in which are of great size.

The Lias is composed of a blue clay of great thickness (500 to 1,000 feet), alternated with thin beds of marl and limestone, the whole full of shells and remains of large extinct reptiles (*Ichthyosaurus*, *Plesiosaurus*). It forms a strip five to thirty miles wide from Lyme Regis, in Dorset, to the mouth of the Tees, in the north of Yorkshire; it is found in the valleys of the Oolitic hills, having consequently a very tortuous outline near this formation. Much of the soil resting on the Lias is a cold, wet, grey clay, though where lime and sand occur it becomes a clayey loam. The principal part of this formation is in old pasture, including the celebrated dairying districts of Somerset, Gloucester, Warwick, Leicester, and Stilton, and the best grazing and pasture land in Nottingham and Yorkshire. Between Sherborne and Yeovil on this formation is perhaps the best apple district of Dorset. Excellent cider apples are produced in Somerset, in the neighbourhood of Glastonbury, on the middle and lower Lias. South Petherton, in Somerset, noted for its parsnips, is on this formation, so is Kingsbury, where its best orchards are said to be. Somersetshire has a large orchard acreage; the county contains so many different formations that it is somewhat difficult to say which is the most favourable to the apple. There are many orchards around Wells, which is on the marl of the new red sandstone; there is also a considerable area of fertile land covered by alluvial soil, including Langport and Bridgwater. The great plum and market garden districts of Evesham, Pershore, Offenham and Tewkesbury overlie the lower Lias, improved by the admixture of glacial drift deposited on the surface of the clay, and thereby increasing its fertility. In the favoured spots, close to Evesham, the fruit and market garden land commands a high price.

There are large orchards in the Chipping Norton district, in Oxfordshire, at the junction of the Lias and lower Oolite formations.

The Oolites stretch as a broad band from Dorset to Yorkshire. This formation includes a large group of rocks varying in character, though chiefly varieties of limestone with two important clays. The name Oolite is given because of the rounded grains forming these limestones.

The Lower Oolite, which includes the Bath Oolite, occupies much of Gloucester (Cotswold Hills), Oxford, Northampton, and Rutland, the heaths of Lincoln, and much of the moorland of North Riding and the Cleveland Hills. The soil varies considerably; much of it is light, calcareous, free-working soil of rather inferior quality. Around Trowbridge (Wilts), at the junction of the lower and middle Oolite, a considerable quantity of various fruits is grown. On the border of the

lower Oolite and Oxford clay is the village of Kidlington, about seven miles north of Oxford; this is known as the "Apricot Village," from the number of apricots grown on the cottages in the village. Near it is a forty-acre orchard with an output estimated at 12,000 bushels.

The Middle Oolite includes the Oxford clays as its principal member; this clay is often rich in lime and affords a good dairying pasture in Dorset, North Wilts, and Huntingdon. The pasture over this clay in Wilts and Somerset rents at 20s. to 60s. per acre, but in some parts it is poor and covered with ant-hills. The extensive fens of Lincoln, Northampton, Huntingdon, Cambridge and Norfolk rest on the Oxford clay. In Bedford, Huntingdon, Northampton, and Lincoln, a considerable acreage of this clay is cultivated.

The Upper Oolite is a narrow band only a few miles wide; it includes the Kimmeridge clay, which produces soil of fair quality, generally rich in lime, mostly in grass. This is the case at Aylesbury, where cows and ducks thrive under the "prune" plum trees.

The Lower Cretaceous series includes the Hastings sand, Weald clay, Kentish Rag, and Lower Greensand.

The Hastings Sand (or iron sand).—These sands extend over an area some forty miles long by twenty miles wide in Sussex and Kent, including Horsham, East Grinstead, Tunbridge Wells, Uckfield, Cranbrook, Tenterden, and Battle. This formation is composed of sand and sandstone, with occasional beds of clay and marl. The ground is generally hilly, the scenery varied and beautiful, but the soil is not generally favourable to agriculture, the average rent being 12s. to 20s. per acre.

The Greensands form a narrow strip running from Dorset to the coast in Yorkshire, being in no place more than eight or ten miles wide; these sands also skirt the Weald of Kent, Sussex, and East Hampshire, as a narrow border between the Weald clay and the chalk.

Much of the lower greensand is light and poor, often covered with heath; the market garden land of Sandy and Biggleswade is, however, an exception, due probably to admixture with other rock. Here seeds are grown, onions and cauliflowers for pickling, and Brussels sprouts and carrots are largely produced for the London markets. The rent of land for market gardening and seed growing reaches £7, £8, and even £9 the acre.

The Weald Clay surrounds the Hastings sand, as a horseshoe, on its inland border in Sussex and Kent; it is four to six miles wide, being low and flat land. The parts of Sussex over this clay used to be forest, and still excellent oak is grown, unfortunately of less value now than when our navy was built of oak. This is a fine-grained, usually pale-coloured clay, which forms a paste when wet, and when dry hardens like a brick; when ploughed it cuts like soap, and the furrow turns over unbroken. It naturally forms poor, wet pasture; however, when drained, it produces excellent farm crops, and grows good fruit at Paddock Wood, Marden, and Headcorn.

The Kentish Ragstone on this formation occurs in the neighbourhood of Maidstone, Ightham, and Plaxtol. The district is noted for cob-nuts. Good hop, fruit, and market garden land near Maidstone lets at £4 to

£5 the acre; it is also a good building stone, as seen at Rochester Castle and many bridges in the district. It is a calcareous sandstone, and when burnt produces a very superior lime. The Hythe beds, of which the Kentish Rag is a member, underlie Ightham, Malling, Mereworth, Watlingbury, Farleigh (which gives its name to the famous damson), Barming, Allington, and Boughton, parishes producing much first-class top and bottom fruit.

The Upper Cretaceous series includes the Gault, the Upper Greensand, the Chalk marl, and the Upper and Lower Chalk.

The Gault Clay divides the lower from the upper greensand. This clay is solid and impervious, and generally blue in colour. Bricks are made from it at Aylesford, Burham, Wye, Dunton Green, and Otford, in Kent. In some places it is marly, and in consequence much more fertile; it is chiefly pasture. Fine oaks are seen on this soil in Surrey, and good ash and elm grow over it in Oxfordshire. The Vale of the White Horse, in Berkshire, is an example of the best soil on this clay, and its worst soils are in Cambridge and Huntingdon.

The Upper Greensand is one of the most fertile of the light soils, especially where mixed with chalk marls. The noted hop-lands of Farnham, in Surrey, are a mixture of chalk, greensand, gault, London clay, and gravelly alluvium; in 1846 the hop-lands in this parish were valued at a rent of £20 the acre per annum, and some hop-land was sold at £500 the acre. Phosphatic nodules are found in the gault and upper greensand; they were formerly ground down for use as manure. Hops are grown over very similar soil at Canterbury. In the neighbourhood of Wantage (Berks) there are a number of orchards on this formation varying from half an acre to three or four acres in extent; the soil is some of the best in Berkshire. There are old orchards of large extent at East Hagbourne. At Blewberry, at the meeting of the upper greensand and the chalk, cherries are extensively grown and the trees attain a large size. At Mentmore (Ducks), situated on the upper greensand, fruit is well grown on Lord Rosbery's estate. At Bromham (Wilts), on the greensand, fruit and vegetables are well grown, and all fruit appears to thrive well here. The principal fruit-growing district of Cambridgeshire lies five to fifteen miles north-west of the university town; in the neighbourhood of Histon, Rampton, Cottenham, and Willingham, on the upper and lower greensand, apples, plums, and cherries grow well, also heavy crops of bush fruit, particularly gooseberries. It will be seen from the above that the greensand is favourable to fruit, and that the application of lime or chalk benefits it much.

The Chalk, with its characteristic rounded hills, underlies a large area of the south-east of England, forming a broad band fifteen to twenty-five miles wide from south Dorset to the north of Norfolk, branching from Salisbury Plain to the North Downs in Kent and the South Downs in Sussex, also smaller areas in Lincoln and Yorkshire.

The Chalk Marl, the lowest bed, forms good soil, especially where mixed with greensand.

The Lower Chalk, without flints, lies to the north and west of the upper chalk, is greyer in colour, produces better soils, and is more valuable

for lime than the upper chalk. It produces thin, white, light soils, well adapted to barley, roots, clover, lucerne, and sainfoin.

The Upper Chalk is harder than the lower. The soils are more or less mixed with flints. It produces a very short but excellent sheep pasture. The abundance of earth worms in chalky pasture is noteworthy. A great portion of the chalk land in Dorset, Wilts, and Berks is "sheep walk"; the narrow valleys are usually devoted to water meadows, sometimes watercress beds. Down pastures are said to range in rent from 5s. to 14s. the acre; arable land on this formation from 12s. to 35s. Chalk is very favourable to the growth of beech trees, as seen in Savernake Forest and on the Chiltern Hills. The box tree is common on the chalk in Surrey.

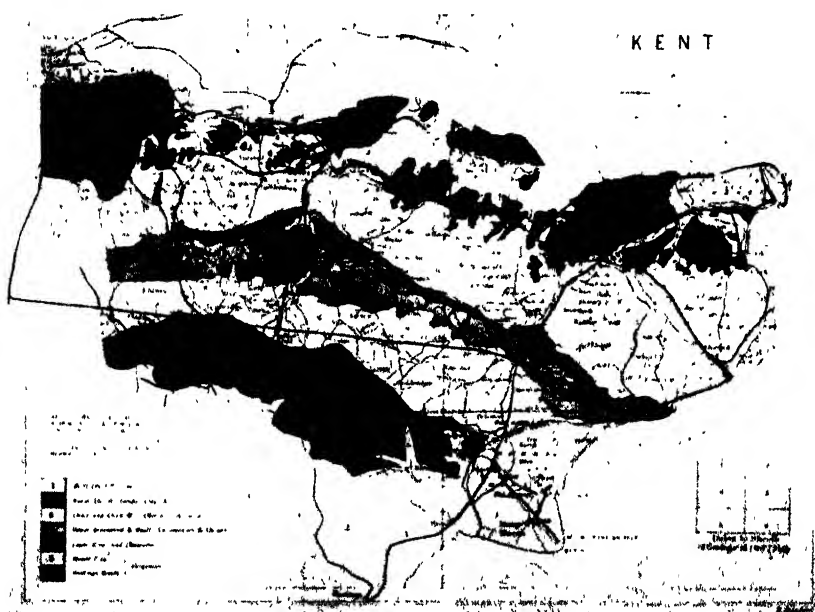


FIG. 75.—GEOLOGICAL MAP OF KENT.

(Reduced from Ordnance Survey, by permission of Mr. Edward Stanford.)

The yew also thrives on it. Many kinds of orchids grow on the chalk downs in Kent, as well as dogwood, spindle, maple, wild cherry, thyme, juniper, burnet, and kidney vetch. In Kent much fruit is grown over chalk or where the chalk adjoins the Thanet sands, or is overlaid by clay. Where the soil is not too thin and it is kept well dunged, strawberries, raspberries, and bush and top fruit grow well over it. Much fruit in the neighbourhood of Southfleet, Swanley, Crocken Hill, St. Mary Cray, Orpington, Chelsfield, and Halstead is over chalk, though probably the best land in this district is over Thanet sands. Chalk soils if manured grow cauliflowers, Brussels sprouts, sprouting broccoli, peas, and runner beans exceedingly well, nitrate of soda and salt being valuable manures for the cabbage tribe on this soil. In Cambridgeshire, in the neighbour-

hood of Royston, plums are grown to high perfection. Again, in the neighbourhood of Worthing, in Sussex, over the chalk very large quantities of hot-house grapes are grown as well as hardy fruits, and there is a very old fig orchard, said to have belonged to Thomas à Becket, proving the mildness of the climate. On the chalk cliffs between Dover and Deal the wild cabbage, ancestor of the cultivated forms, grows freely, and rhubarb, which contains much oxalate of lime in its stem, thrives particularly well over chalk, if well manured. With the chalk ends the secondary period of the rocks.

The *Tertiary Period* comprises rocks, in which are found fossil remains of plants and animals similar to, or identical with, those now existing.

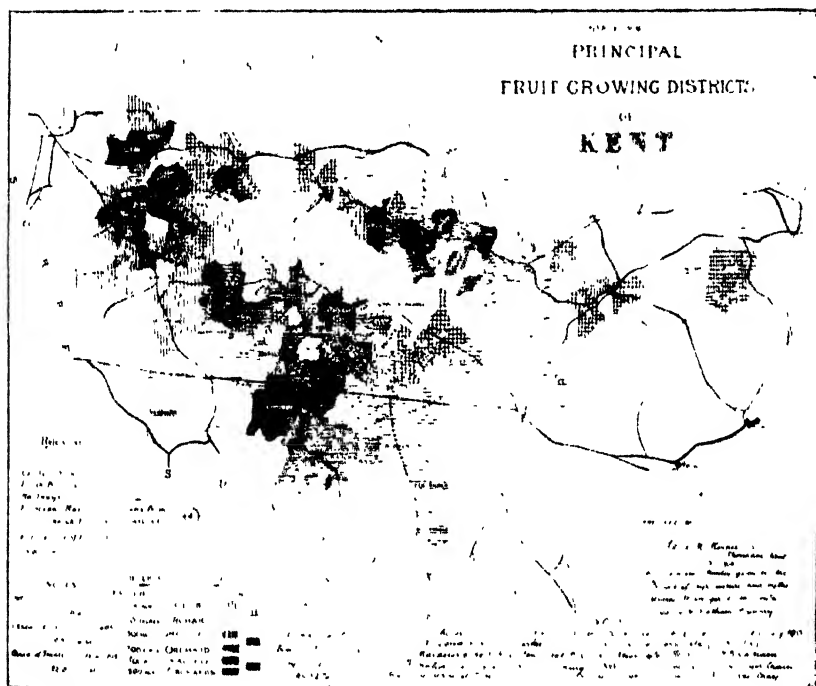


FIG. 76.—MAP SHOWING PRINCIPAL FRUIT-GROWING DISTRICTS OF KENT.

The first group of beds is the *Eocene*, which includes the Thanet sands, the London and plastic clays, and other beds.

The *Thanet Sands*, so named by Sir Joseph Prestwich, are specially well seen at Pegwell Bay and at Reculvers, and occur in patches overlying the chalk in the north-east of Kent. The fruit lands around Dartford, Bexley, St. Paul's Cray, St. Mary Cray, Hockenham, Swanley, Well Hill, Swancombe, Betsam, Southfleet, Cobham, Shorne, and Gillingham (near Chatham) rest chiefly on these sands. This rock is a fine grey or buff-coloured sand. It makes a free soil, which can be worked in almost all weathers, moderately fertile, but if well manured very productive, and much of the best fruit and market garden land lies over it, growing all kinds of hardy fruit and vegetables well, but the

large fields of strawberries and raspberries are, perhaps, the most noticeable feature. On the Essex side a patch of this rock, about eight miles long, one mile wide, lies to the north of Purfleet, Grays, and Tilbury. Again, in North Mid-Kent, Sittingbourne, and Newington (noted for cherries) overlie this formation. Further west, Teynham and Faversham, which probably produce the finest cherries in the world, are over Thanet sands and brick clay, with chalk some 20 feet below. Higham, near Rochester, another fruit district, is on similar soil. Canterbury, where much fruit and hops are grown, lies over brick earth, gravel and sand, with chalk below at some depth. Bexley Heath (where strawberries are extensively grown), Sidcup, and Chislehurst are over gravel, known as the Oldhaven beds. Eltham and Ruxley are on the clayey rock of the Woolwich beds.

The London Clay, with beds of the same group, including certain gravels, extends over the greater part of Middlesex, the south-eastern half of Essex, parts of Berks, Hertfordshire, and Suffolk; also in the north of Surrey and Kent, the southern half of Hampshire, and part of Dorset. It is in general a tenacious soil of bluish or brown colour, liable to crack in summer. It is chiefly old pasture which is rich and abundant.

In the neighbourhood of Romford, Dagenham, and Rainham market gardening is carried on in a very skilled manner on a large scale. Immense quantities of peas are grown in this district for the London markets, large quantities of London manure making the land very fertile and improving its texture. There are good old orchards in the neighbourhood of Twickenham and Isleworth, where the extension of London has not yet supplanted them by brick and mortar. Fruit is well grown near Brentford and Orsett. At Stanford-le-Hope strawberries are extensively grown. Fruit is commercially grown at Halstead, in North Essex, and at Tiptree Hall (Mechi's Farm), near Kelvedon, on this formation. Cheshunt and Waltham Cross, noted for roses, are on London clay. The parts of Essex suffering most severely from agricultural depression rest on the London clay; here winter beans are one of the principal crops, and this is followed by corn. Many of the farms are now in the hands of Scotch farmers and utilized for milk production instead of cultivated for wheat. There are many brick and tile works on this formation. Many millions of bricks are made annually at Sittingbourne, in North Mid-Kent, where the top soil is preserved and put back after the clay has been dug out. The land seems improved by the process; excellent cherry and apple orchards grow in the district, usually under grass grazed by sheep receiving cake or corn. This clay extends along the north of Kent, with certain intervals. It is very noticeable in the Isle of Sheppey, where it is used for cement making. Sandy wastes of small agricultural value occur over beds of this formation, such as at Aldershot, Bagshot Heath, and the New Forest.

In Hampshire (on the *Middle Eocene beds*) strawberries are largely grown, chiefly on small holdings, often owned by the cultivators. These are to be seen around Titchfield, Botley, Sarisbury, and Swanwick. Some of the land has a very favourable southern aspect, so that the fruit is a week or more earlier than that of Kent, which gives it a great advantage in price.

The Pliocene Beds, including the Norfolk and Suffolk Crags, form a narrow strip on the east coast of these counties, particularly well seen at Felixstowe. The crag consists of rolled pebbles, mixed with marine shells, coprolites, and teeth of reptiles, all more or less impregnated with oxide of iron, giving a reddish colour. These coprolites, being rich in phosphate of lime, are dug out, ground, treated with sulphuric acid, thus converting the phosphate into "superphosphate," in which the phosphoric acid is readily available for plants, giving better results than basic slag on soil containing excess of lime such as soils over the chalk. The Crag produces a fertile, loose, loamy soil.

Boulder Clay, Sand and Gravel are materials that were transported by ice or ground to powder in the bed of glaciers. This material has in many places altered or modified the soil by spreading over the main rocks. This has been the case on some of the chalk of Norfolk, the new red sandstone in the south-east of Durham, in Cheshire and Lancaster, and over some districts of the London clay. Glacial deposits exist at Nottingham and Mansfield, at Hatfield in Hertfordshire, at Highclere in Hants, and from Norwich to Cromer in Norfolk, but they do not extend south of the Bristol Channel or the Thames Estuary. The character of the soil varies with the nature of the deposit, and the preponderance of clay, sand, or gravel.

Alluvial Soils are chiefly found at the mouths of slow-flowing rivers and on the sides of the valleys through which they pass. Owing to the large mixture of materials brought down by the river in its course, these soils are almost always fertile and easily worked, producing probably larger crops and more grass than any other geological formation. Examples of these we have on each side of the River Humber, and on the coast of Lincolnshire. The marsh land here has been reclaimed at one time or another from the sea and protected by sea walls, which were first made by the Romans. The Wisbech district, near the Wash, is now a most successful fruit-growing district. Here fruit has only recently been introduced; this land, although low-lying, seems to be but little liable to injury by spring frost, perhaps due to being near the sea. Raspberries thrive here specially well. Fruit is also grown at Holbeach and Spalding, though the latter is better known for bulb growing; opium-poppies are also grown. The sides of the Thames in Essex and Kent are covered by rich alluvial soil, forming rich pastures called marshes. At Cliffe, in Kent, there are good orchards on this soil. At Sandwich there is similar soil on which fruit is grown; here also market gardening, which was first started by the refugees from the Continent when religious persecution was rife, is carried on. There is rich alluvial soil bordering the Severn between Bridgwater and Weston-super-Mare, and extending many miles up the rivers Parret, Yeo, Axe, and Brue. On the coast of Lancashire and the mouth of the Solway, and far inland on the banks of many rivers, the soil is made more fertile from alluvial deposits. Examples of such land are to be found on the banks of the Ouse, Derwent, Trent, Wye, and Usk.

Peat and Fen.—Peat accumulates quickly in stagnant water, filling up hollows, and at last forming land safe for the foot to traverse; such is seen at Chat Moss, west of Liverpool, the moors of Yorkshire, and on

the Solway Firth, the fen-lands of Lincolnshire from Wainfleet to Peterborough, in Northampton, and at Ely, March, and Croyland. The last district lies further inland than the marsh land, and has been reclaimed by drainage, first taught by the Dutch engineer employed by Charles II. This land produces much straw and heavy potato crops (ten tons to the acre being not uncommon); these are known in the market as "black-land" potatoes.

MODIFICATIONS OF LEAVES AND STIPULES FOR SPECIAL PURPOSES.

By Rev. Professor G. HENSLOW, M.A., F.L.S., V.M.H.

[Lecture delivered October 27, 1908.]

The Origin of Leaves and Stipules.—A leaf may be regarded as consisting of three parts, any one or two of which may be absent—viz. the *petiole*, or stalk, with or without *stipules*, and the *lamina*, or blade. This may be “simple”—i.e. of one piece—or “compound,” being divided into separate “leaflets.” Transitions between deeply lobed simple leaves and compound ones are frequent.

The anatomical source of leaves is deep-seated in the shoot, the epidermis being continuous externally. The woody cylinder of the stem

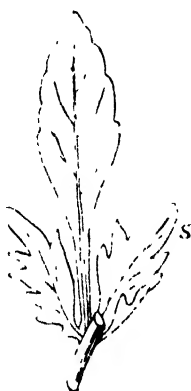


FIG. 77.—LEAF OF PANSY, SHOWING THE MIDRIBS OF THE STIPULES.

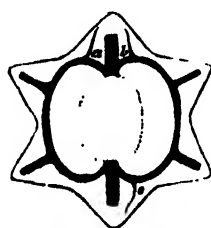


FIG. 78.—TRANSVERSE SECTION OF NODE OF *GALIUM*.

is composed of a ring of separate fibro-vascular bundles ; one leaves its position and passes upwards through the cortex to supply the midrib of the external petiole and blade. One or more arise from the cylinder on each side of the leaf—not necessarily adjacent to it—and enter the sides of the petiole, often causing this to be channelled above, as may be seen in members of the *Umbelliferae*, supplying strength, just as in the “stays” of a Fox’s umbrella frame.

If stipules are present their midribs arise as fibro-vascular bundles from the *outermost ones* of the lateral bundles entering the petiole of the leaf, and *never* directly from the stem-cylinder of bundles (fig. 77). The violet, dock, and hazel furnish good examples.

If there be two and opposite leaves at the same node, then a fibrous “stipular zone” is formed within the cortex connecting the petiolar bundles. The midribs of the stipules are supplied by this girdle, or zone. A transverse section of the node of a *Galium* illustrates this very well (fig. 78), stipular cords (a, b, c,) entering the petiole.

The normal number of stipules will be two to each leaf. Consequently four would occur with opposite leaves; but the stipular zone is capable of supplying additional ones; so that the members of the tribe *Stellatae* of *Rubiaceae* sometimes have more than four so-called "leaves" at a node; for the stipules assume the same form and size as the two true leaves, but these only can produce buds in their axils, and the leaves can be recognized by their presence.

The order *Valerianaceae*, allied to *Rubiaceae*, is exstipulate; but *Centranthus ruber*, the "red valerian," which has established itself on walls, &c., has the stipular zone and several branches proceeding from it; but they do not reach the surface. Hence it would seem to

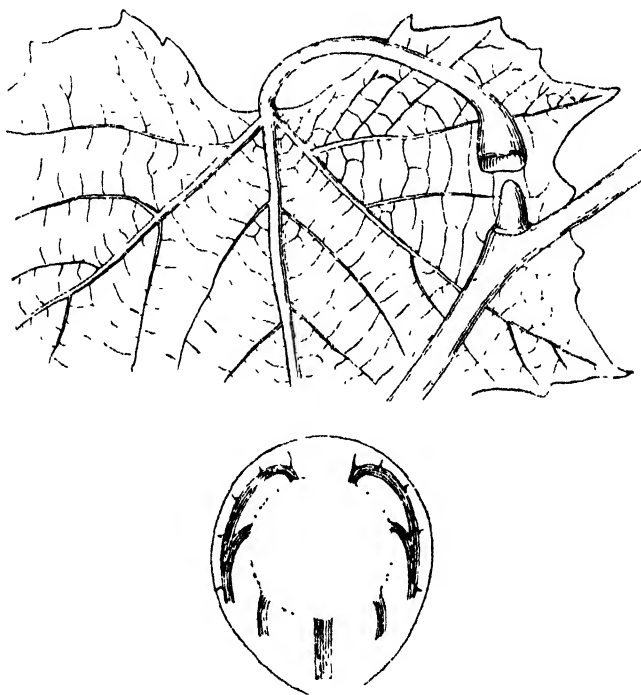


FIG. 79.—TRANSVERSE SECTION OF PETIOLE OF PLANE, SHOWING HOW IT SURROUNDS THE BUD. THE UPPER FIGURE SHOWS THE LEAF JUST REMOVED FROM THE SHOOT.

indicate that the order is descended from a stipulate one, but nothing now remains but the rudimentary fibro-vascular cords, the external stipules being totally arrested.

When the petiole sheathes the stem, as in *Polygonum*, numerous bundles may be given off from the sheathing stipule, as seen in species of this genus; even without sheathing many separate fibres may enter a stipule, as in the pansy, all arising from the outermost leaf-bundle.

Modifications of Parts of Leaves.—As the summer declines the winter buds are formed in the axils of the leaves. Though the outer parts of the bud protect the inner, the leaf itself also provides for the protection of its bud. This is often done by the base of the petiole. Sometimes the base of the leaf-stalk merely thickens around the bud, burying it, as it were.

Occasionally the edges of the petiole unite and so form a funnel-like cap over the bud, as in the plane (fig. 79) and mock-orange (*Philadelphus*) (fig. 80); or the stem and petiole may both swell above the bud, making a little cavity for the bud, as in *Kalmia* (fig. 81).

Of course, the main use of the petiole is to extend the blade so as to expose it to the light. To impart strength to it the main fibrous bundle

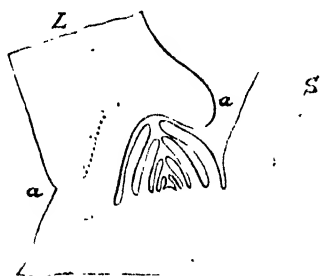


FIG. 80.—PHILADELPHUS; (L) LEAF, (a, a) LINE OF SEPARATION OF PETIOLE, (S) STEM.

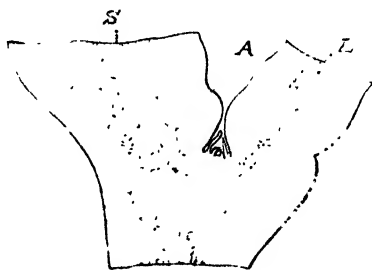


FIG. 81.—SECTION OF STEM (S) AND PETIOLE (L) OF KALMIA, SHOWING AWELLINGS (A) WHICH PROTECT THE BUD.

shows in a transverse section the form of an arc or section of a circle, the lateral bundles being above the ends. Thus the groove is formed as stated. Occasionally, as in sycamore, they are arranged in a complete cylinder, as in a stem. In climbing plants as *Clematis*, *Wistaria*, *Solanum jasminoides* (fig. 82), &c., as soon as the petiole or stem has secured a hold to support the plant, the fibrous bundles increase considerably in size to



FIG. 82.—TWINING PETIOLE OF SOLANUM JASMINOIDES.

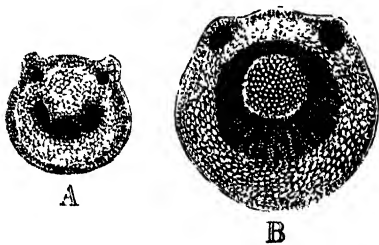


FIG. 83.—SECTIONS OF PETIOLES OF SOLANUM JASMINOIDES (A) BEFORE, (B) AFTER SECURING HOLD ON SUPPORT.

resist the strain now put upon them as seen in Darwin's figures of *Solanum jasminoides* (fig. 83, A, B). In extending the base of the petiole round the stem additional strength is acquired to support a heavy blade, as in *Polygonum* and the *Umbelliferae*; while in palms the fibres, besides sheathing at the base, cross in two bands embracing the stem, the weight of many palm leaves being enormous.

The "skeleton" of a dicotyledonous leaf shows how the fibres branch in order to support the intervening chlorophyllous tissue and display it to the light with the greatest advantage. As a general rule the more leaves grow naturally, well exposed and having plenty of water, the broader they are in comparison with others. If, however, plants habitually grow in very dry places the leaves become greatly reduced. The result is they assume the "ericoid," or heath-like, type, as in South African *Pimelias*; or they may be of the box-leaf form, as in alpine *Veronicas* of New Zealand; or minute, as *Lycopodium*; or, again, there are the "needle" form of conifers, or the *Thuja* type; or they may vanish altogether, as in the broom. When this is the case the green stem undertakes the functions of leaves, as it does in *Cactaceae*, fleshy *Euphorbias*, and *Stapelias*, in many of which the leaves are reduced to spines; but it must be borne in mind that spiny stems, leaves, bracts, &c., do not imply any intention on the part of nature that they should act as *protections* against browsing animals, for they are simply inevitable results of drought, or xerophytic conditions, to which the plant cannot help responding.

On the other hand submerged aquatic leaves are also degenerated from an opposite cause. Among dicotyledons, which have become aquatic from an ancestral terrestrial habit, as of buttercups, the blade, still retaining the radiating distribution of the skeletal fibres, has the interstitial chlorophyllous layer totally arrested; so that the blade is described as "dissected," as in the water-crowfoot. This has been proved to be due to the inability of the protoplasm of the stem to form a complete blade, because of its supersaturation by water, and it has thus become too weak to develop the leaf. This difficulty can be, and has been artificially, by Mr. MacCallum, of the United States, overcome by rendering the water denser with nutritive salts. Osmotic action was set up, so that the protoplasm of the stem recovered its normal strength, and then the subsequent leaves formed under water were complete and not dissected. The plant he employed was *Proserpinaca palustris*, which has complete leaves in the air, but dissected ones when submerged.

Monocotyledons with parallel venation in their so-called "leaves," which are really homologous with petioles, retain the ribbon-form as long as they are submerged, as in *Sagittaria sagittifolia*; but when they approach the surface a blade may be formed at the top.

A broad petiole thus acting as a leaf is called a phyllode. In the case of the Australian *Acacias* the blade is seen in the seedlings, but as a rule it is arrested in the later leaves. The blade is retained, however, in *A. melanoxylon*.

If it be asked why some leaves, as of most members of the *Leguminosae*, have compound leaves while others have simple ones, a hint is at least given by plants in which transitions and intermediate forms occur. Thus, if a long summer-shoot of the snowberry (*Symphoricarpus*) be examined, the first formed leaves, at the base of the shoot, are small, with an oval edge; but in the middle of the shoot the leaves are very much larger, but more or less deeply indented. Then, again, as the vigour declines the terminal leaves reassume the form of the first. The interpretation might be suggested that the changes of

form are due to the joint effect of vigour of growth and assimilation. At first both are feeble and equal; but during the period of their maxima the growth, as seen in the *size* of the blade, is not quite supported by the assimilative process; hence the blade is imperfect. As, however, the season declines both become again equalized, and the small complete leaf is formed like the first. Such, having become a fixed and hereditary habit, may be seen on any bush of this species.

Winter-buds.—With regard to the structure of the winter-bud the protecting scales are often simply arrested petioles or their basal portions. This is easy to be seen in the case of the horsechestnut, or currant, if the expanding bud in spring-time be examined. The inner parts consist of the delicate rudiments of next year's stem and foliage, with or without a flower-bud, the innermost scales being sometimes hairy or woolly, as an additional protection against cold. The scales gradually fall off as the bud expands and the shoot begins to grow.

In many trees the scales are not petiolar but stipular, as in oak, lime, &c.; but in the *Rosaceae* the stipules sometimes combine with the petiole to make the scales, as in the whitebeam (fig. 84). More rarely the blade of a sessile leaf acts as a protecting scale, but this is the

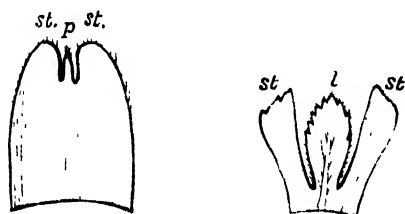


FIG. 84.—STIPULES OF WHITEBEAM COMBINING WITH PETIOLE TO FORM BUD SCALES; (st) STIPULES. (p) BASE OF PETIOLE, (l) LEAF BLADE.

case with the lilac (fig. 85). The blade of the leaf of the tulip-tree also acts as a protection by covering the bud.

In the case of bulbs the protecting scales are often merely the sheathing bases of the leaves, the upper part being arrested. In *Allium Crameri*, which has to endure a temperature of upwards of 120° Fahr. in the desert sand near Cairo, the outermost scales, though of cellular tissue only, have almost a woody texture.

There is still another use which the base of the petiole may sustain—viz. as a storehouse of nourishment and water. This is the case with bulbs, and in the wood-sorrel it will be found that the petiole articulates above the point of insertion, the swollen portion remaining containing an abundance of starch.

Stipules.—The main use of these organs to the plant, when associated with a fully developed leaf, is to protect the new bud in its axil, especially when the petiole is not dilated at the base, as in the garden-pea. In this and many others the stipules are green, and fulfil the functions of a leaf, being enlarged in compensation for the loss of some of the leaflets now utilized as tendrils. In *Lathyrus Aphaca* (fig. 86) the leaf is often entirely suppressed. In the *Galiums*, as stated, the stipules are precisely like the leaves; hence they form together whorls, which suggested the

name, *Stellatae* for the tribe. In many herbs the stipules are large and foliaceous, as in the heartsease.

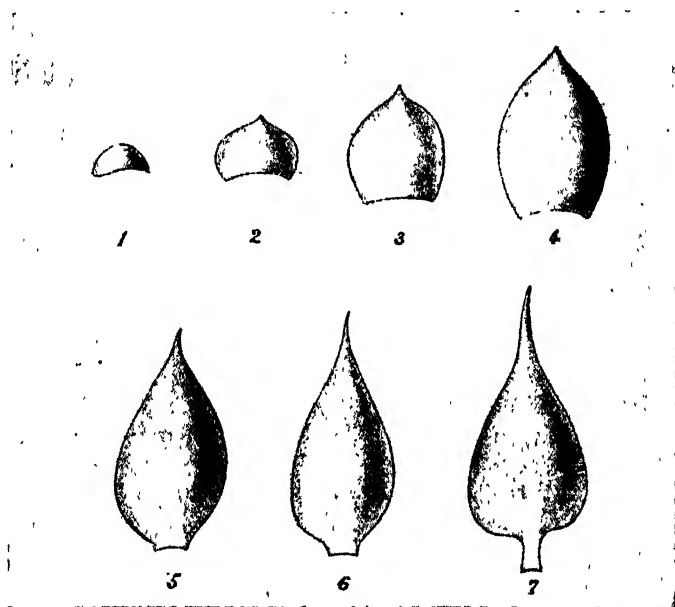


FIG. 85.—TRANSITION FROM BUD SCALE TO FOLIAGE LEAF IN LILAC.

In some herbs growing in deserts and dry situations the stipules become scarious, and completely conceal the buds behind them, protecting them from the glare and heat. Such occurs in several members of the *Illecebraceae*, the stipules being colourless and silvery.



FIG. 86.—LATHYRUS APHACA.

In many xerophytic plants and trees the stipules assume the form of spines, as in *Robinia*, *Acacia*, &c. The interpretation may (theoretically)

be suggested that they are developed *before* the wet season has fully arrived, the oncoming of which then produces the green foliage.

An analogous case is the spinescent bracts of the involucre of *Centaurea Calcitrapa*, formed *after* the non-spinescent foliage has developed, as the wet season is presumably closing; for no other cause is known of spinescence than drought. In a good soil and plenty of moisture spinescence generally disappears, as it will if furze, restharrow, or barberry, be grown in a moist air and soil.

In a few cases the stipules act as tendrils; that is to say, if they may be so regarded, as in *Smilax* and the *Cucurbitaceæ*; but the fibro-vascular bundles in monocotyledons are all separate, and the tendrils in bryony (*e.g.*) issue from the stem in a very similar manner, as the woody fibres are anomalous in their distribution in this family.

Lastly, in some cases the stipules secrete honey, as in *Tropaeolum ciliatum* (fig. 87); but glandular stipules are common in many families.

One of the most interesting explanations of the action of tendrils has been given by Mr. H. J. Shannon* in describing his experiments with

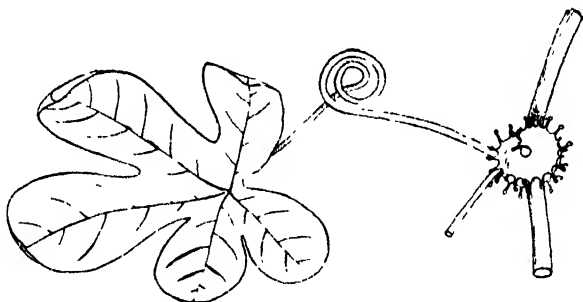


FIG. 87. *TROPAEOLUM CILIATUM* WITH HONEY-SECRETING STIPULES.

the tendril of a pumpkin:—"A pencil was hung slack against a young tendril. After nine minutes the tip had curved. In ten minutes the tendril tip was parallel, round the pencil, with the lower part like a staple. In thirteen minutes the coil was completed and tight. The free tip, with its short remaining piece of tendril, tried to make another coil. After a moment or two it became evident that the curling motion had ceased entirely. The shoot bearing the tendril had been gradually leaning towards the pencil. The tendril, however, had exerted no 'pull,' for the pencil hung vertically all the time. This movement of the shoot produced a slackness in the tendril, and this slackness was now taken up by the coil already formed, as it worked itself slowly forwards about the circumference of the pencil, and so added this new winding material to the free extremity. The tip now commenced to move forward again, hugging the pencil, and by a slight upward inclination succeeded in laying its flattened surface snugly and firmly against the coil already formed. Once again, however, before this second coil was completed, the material became exhausted and the winding motion ceased as before. The stem inclined itself still further, and the length so given was again

* *Harper's Magazine*, July 1907, p. 296.

utilized by the slowly revolving coil until the tip was free to move forward and complete the grasp it had attempted. One hour had elapsed since it began."

Mr. Shannon follows the above account by showing how the subsequent coils are made in the attached tendril, half the number of coils being in one direction, and half in the opposite—a mathematical necessity to balance opposing strains.

"Having caught and coiled firmly round an object, the tendril makes a sort of loop near the point of attachment of the tip. Then a broad bent portion swings slowly and gradually downwards. This portion, which may be likened to the crank-handle on the middle of a shaft, continues to swing downwards, and then backwards and upwards, completing one revolution. As it does this the tendril becomes coiled on both sides of the 'crank,' in one direction on one side and in the opposite direction on the other."

This crank motion being repeated again and again, the numerous opposing coils are made. The use to the tendril is the elasticity afforded, allowing for a pull or jerk without rupturing it. Moreover, as soon as the strain is felt, the whole length of the tendril thickens and becomes consolidated.

[Figures 78 to 81 and 84 to 87 are from "Buds and Stipules," by kind permission of the author, Lord Avebury, and figures 82 and 83 from Darwin's "Movements and Habits of Climbing Plants," by kind permission of Mr. John Murray.]

BRITISH WILD FLOWERS IN THE GARDEN.

By J. W. ODELL, F.R.H.S.

[Lecture delivered November 10, 1908.]

WITH all the wealth of hardy and alpine plants from the remotest parts of the world at our disposal, and with collectors continually sending home new and little-known species for our gardens, it may probably seem that to draw attention to purely British plants for garden decoration is to ignore to some extent the great advantages we enjoy for enriching the hardy flora of the garden. Allow me, therefore, to say I am not in any way suggesting anything so insular as to give preferential treatment to Britishers over the thousands of lovely plants from other lands which have found a home in our herbaceous borders, rockery, and water gardens. To do so would be foreign to the true aims of horticulture.

I do, however, venture to claim for our native plants some measure of attention, and to urge that, where circumstances will permit, they should be fostered; and I am strongly of opinion that, beautiful as are the older favourites of the borders, there are potential beauties yet unknown in many of our British plants if they are given the cultivation and attention so freely lavished on others from over the seas.

I feel confident that when this attention is given it will result in the production of plants attractive enough to justify their inclusion in the garden and to add interest and character to their environment.

There are, of course, a few of our wild flowers that always have been and always will be grown and treasured in our gardens, and we grow them, not so much because of their British origin as by reason of their intrinsic worth and beauty. This is especially true in reference to our wild trees and shrubs, for, from the flowering of the willows to the last blossom of the elder, we have a long succession of flowering trees and shrubs of no doubtful British origin.

Is there a more lovely sight, in late spring or early summer, than a fine wild cherry (*Prunus Avium*) in full flower? A typical picture of strength and beauty, a beauty unsurpassed even by its brilliant autumnal colouring. Its first cousin the bird cherry (*P. Padus*) is not, perhaps, so brilliantly beautiful, and is less aggressive in its habit of growth, but it is more lasting, and a tree worth a place in every collection.

The common crab (*Pyrus Malus*), although surpassed by some of the cultivated varieties of crab in neatness of habit and depth of colour, yet is a most attractive object in the hedgerows, and, when given a place in the wild garden or the outskirts, well repays the favour of admission by its pinkish-white shower of petals and its pale yellow fruits in the autumn.

Out of pure gratitude for the many beautiful forms of flowering thorns, the common hawthorn (*Crataegus Oxyacantha*) ought to have a place in the garden. To clip it and keep it as a mere hedge plant is,

of course, simply to make a servant and a slave of it; much more favour must be shown it in order to see it in its beauty and to enjoy its full fragrance.

Perhaps it is a little difficult to say at which period of the year the mountain-ash (*Pyrus Aucuparia*) is the more beautiful, whether when it is hung with its tawny-white clusters of sweet-smelling flowers, or when its scarlet fruits are mature. The former period in Middlesex is less fleeting than the latter, for the hosts of birds quickly strip off the berries as they ripen, and, much as one may grudge them the feast, there is still the consolation that they are assisting to disseminate and increase a very beautiful form of tree life.

Amongst the smaller British trees the spindle tree (*Euonymus europæus*) and the two Viburnums, the guelder-rose and the wayfaring tree, are most attractive in the shrubbery; indeed, the first, our only British *Euonymus*, is deserving of a special bed or clump to itself. Grown in this way it is particularly bright and interesting in the autumn months, when its crimson capsules dehisce and expose the orange-coloured arils of the seeds, a combination of colour reminiscent of the tropical gourd *Momordica Charantia*.

The wayfaring tree has a more "garden" appearance than those I have previously noted—rigid and prim with its handsome pubescent leaves and white cymes of flowers, followed by black fruits, it stands out in our gardens sturdy and typically British.

To grow the guelder-rose so as to see it at its best it should be planted near to the water's edge, where in the autumn its red translucent berries (or drupes) give a picturesque effect. A mass of this shrub growing by the old mill stream at Bushey, with the roots dipping in the water, is literally covered in the early autumn with berries, and has afforded a subject for many a wandering artist of the nature-loving type.

A quaint, attractive, and interesting berry-bearing shrub is the sea buckthorn (*Hippophae rhamnoides*), more often seen in seaside gardens and near the coast than in inland gardens. Grown in a group, the colour contrast between the clusters of orange berries and the silvery foliage always commands attention. Away from Cromer, the finest example that I know of this desirable British shrub is in the Aldenham House collection, where Mr. Beckett has given the species the position its merits entitle it to.

Any reference to British shrubs without mention of the gorse and broom would be incomplete. A writer in the "Times" recently described these two shrubs as the most splendid of shrubs, British or exotic. This, of course, is high praise; but all who have seen the sheets of golden colour (and who has not?) lighting up some wide expanse of common or moorland, or some tall cliff, will, I think, agree; and I would only add that with them should be bracketed the dwarf whin (*Ulex nanus*), a species that flowers later, and thus keeps up until quite the end of the summer the glory of the better-known *U. europæus*.

There are not only trees and shrubs but many other British plants that one expects to see in any well-ordered garden, though one does not at first associate them with British wild flowers. What garden having any pretence to the name would be without snowdrops and Lent lilies,

lilies of the valley, and primroses? And, should it possess an herbaceous border even of the smallest dimensions, aconite, columbine, larkspur, and snapdragon can always be relied upon to represent our obligations to our native flora. True, these plants may not always represent the old type, but then they are often beautified by garden improvements, as in the case of our cornfield poppy, which repays a thousand times the care bestowed upon it by the careful improvement and cultivation given it originally by the owner of Shirley Vicarage Garden.

Public Parks and Gardens.—May I be permitted now to deal with British plants in our public parks and gardens?

There has been a great tendency of late years to increase the educational value of these gardens by giving information as to the natural habitat of trees and shrubs as well as the botanical name. This practice has not escaped the criticism of representatives of the London Press, or rather some of them, who take exception to the use of long names, and who regard a well-written and probably correct label as waste of money. To anyone who will take the trouble, on a quiet walk through one of the public gardens where this practice prevails, to observe on a fine Sunday afternoon, or even a weekday evening in summer, the conviction will be borne in that it is not only students and gardeners who appreciate the information given, but the general public are as interested in the native country of the plants labelled as are those more directly connected with gardening. This being so, I am the more inclined to urge the extended use of our native trees, shrubs, ferns, and flowers as a means of intensifying that interest in British plants which is common to nearly all townspeople, and to show to those whose mode of life prevents them from seeing much of the countryside, except perhaps for a few days once a year, some of the more beautiful and interesting of our native wildings.

Such a course would be of great service to those teachers who are now taking special pains to give to the school children some form of nature teaching, inasmuch as beds of British wild flowers growing in some accessible part of an open space or public garden, properly labelled with the correct British and botanical names, would give the young people a far more correct idea of the plants than the cut specimens they see only for the space of a short lesson. To see the plants growing within a reasonable distance of the school would give them an insight into the life-history of the plant, an advantage very difficult to estimate.

It may, of course, be urged that many of our wild flowers are unsuitable for cultivation, and it is of course obvious that no good purpose would be served in cultivating such common weeds as the chickweeds, thistles, small Compositae, and plants with tiny, inconspicuous flowers; but, on the other hand, beds of such plants as *Epilobium angustifolium*, *Lysimachia vulgaris*, and *L. thyrsiflora*, *Lychnis Flos-cuculi*, *L. vespertina*, *Malva moschata* and its white variety, *Iris foetidissima*, *Jasione montana*, and, in specially prepared beds, plants partial to peat, chalk, and limestone soils, would enhance the enjoyment of the general public.

From a purely horticultural point of view there is much to be said for the course I am advocating, and I am quite aware that something may also be said against it; this much, however, I may urge, that the use of British wild flowers where practicable, either in beds, rockeries,

or bogs, and the margin of water, adds greatly to the enjoyment of visitors, is a change from the ordinary subjects usually grown in such positions, and is an incentive to the workers in such positions to render their use attractive, decorative, and educational.

Aquatic Plants.—Perhaps no section of plants is more interesting than those associated with water, and certainly our native aquatic plants are both numerous, interesting, and worthy of cultivation. It will be convenient to arrange them in accordance with their habit of growth.

Two plants occur to me as typical of really noble foliage and form, the great water dock (*Rumex Hydrolapathum*) and the butter-bur (*Petasites vulgaris*). The former when growing in congenial surroundings, such as the side of a stream or lake, or indeed any piece of water, is a noble plant, often growing with leaves 18 inches long. It is not a plant to coddle in any small pond or even to admit in the more cultivated part of the garden, but on the outskirts of the pleasure-grounds or by the side of water or the wild garden it is one of the most conspicuous of our British aquatic plants. *Petasites vulgaris*, too, should be grown only when it can ramble and develop without hindrance. Its large masses of leaves, rivalling the Gunneras, form an excellent shelter and background for less vigorous subjects, and bare banks may be often furnished and rendered beautiful by the introduction of this sturdy British plant. It is, perhaps, only fair to say that it is a rambling and encroaching plant, and should be kept in check and not allowed to monopolize the soil and ground away from the water's edge.

Two plants of the buttercup family can with great advantage be associated with the cultivation of the butter-bur, *Ranunculus Lingua*, the great spearwort, and the kingcup (*Caltha palustris*).

The former is not so well known as the kingcup, but it is a very handsome and striking plant, and well repays cultivation, growing often to three feet, with bright green succulent foliage towering well above the smaller growing plants.

A mass of the kingcup (*Caltha palustris*) gives the waterside a great attraction; the plant flowers early, and lasts for many weeks, and even after the harvest of golden flower there still remains the rich foliage. To see the kingcup to perfection one must see it growing in the damp and often flooded meadows along the valleys of the Colne and Great Ouse, where in April and May one may see acres of its golden flood.

Other waterside plants that give distinction to any sheet of ornamental water are the yellow flag (*Iris Pseud-acorus*) and the purple loose-strife (*Lythrum Salicaria*). A mass of the yellow flag adds beauty to the most formal bank or slope. Planted and grown with judgment and care, with some liberally enriched soil near its roots, it is a truly handsome plant with its erect and spear-like habit of growth, and gives beauty of form to those plants surrounding it. The purple loose-strife is one of those plants that gain by proximity to a clump of iris. The colour of the loose-strife is deep and rich, but it is the contrast in growth that is the most striking feature—the lovely waving branches of this plant form such a picture when seen flowering in company with the clear yellow of the iris that it does not need an artist to thoroughly appreciate these two water-loving wildings. A walk along any river-

bank or streamlet a few miles from town will reveal other waterside plants that will add interest in the water-garden, some, like the water forget-me-not and the creeping Jenny (*Lysimachia nummularia*), which have a place in every garden; others, like the hemp-agrimony (*Eupatorium cannabinum*), with its tawny plumes, and the blue crane's-bill (*Geranium pratense*), are not so familiar away from their wild habitat. With these, too, we may find the bur-reeds, *Sparganium ramosum*, and *S. simplex*, as well as the lesser reed-mace bullrush (*Typha angustifolia*), a graceful plant and one that can conveniently be grown where its larger relative, *T. latifolia*, would be out of place.

With these can be associated the sweet flag (*Acorus Calamus*), an easily cultivated plant, with leaves having a delicious aromatic odour when slightly bruised, and very ornamental.

Of the plants preferring to grow in shallow water or by the shelving side of the river, the flowering rush (*Butomus umbellatus*) is always the most conspicuous, and with its bright rose-red umbels of flowers and graceful light leaves, it has few, if any, rivals amongst aquatic flowering plants. A patch of the white water lily (*Nymphaea alba*) growing in its vicinity serves to heighten the beauty of the flowering rush by contrast of form and colour. Two other genera of the Alismaceae, *Sagittaria* and *Alisma*, add interest to the water garden by reason of their leaf form, the arrow-head especially being worthy of growing in company with *Butomus*.

There is one plant that is frequently found in company with these aquatics that is especially interesting and beautiful—I refer to the bogbean (*Menyanthes trifoliata*). I regard this as one of the prettiest native plants, and one that should have a place in every collection of aquatic or semi-aquatic plants. My first acquaintance with this beautiful plant in its native wilds was some years since at Windermere, where on the boggy land towards Troutbeck I saw it for the first time in its full beauty, and I know of no more beautiful sight than a great breadth of this wilding in full flower growing in a bog on the otherwise bleak hills. It is by no means difficult to grow. I have flowered it well in large pots standing in tubs and in baskets submerged in a wide ditch. The baskets have only to be filled with turfy soil and then sunk to the water level.

Another floating aquatic allied to the bogbean is *Villarsia nymphaeoides*, a miniature water lily with curious yellow flowers, a very beautiful water plant, but one that requires to be kept within bounds, as it spreads rapidly and is apt to monopolize a small lake to the disadvantage of other plants, and is rather difficult to eradicate when once it has gained a good footing.

In this respect I should also mention the water violet (*Hottonia palustris*); it is a delightful plant, and in a confined space in shallow water flowers very freely, the spikes resembling *Primula japonica*, but being much sweeter. It is apt, like *Villarsia*, to fill up with its growth the water in which it has taken root.

To grow the smaller aquatics properly some kind of shallow bogland is needed. This is easily contrived when the garden is damp or near water by taking out a bed and filling the base with clay; on this should be put peat, leafy soil, and river sand. In such a bed it is possible to have nice clumps of such choice bog plants as sun-dews (*Drosera*) and butter-

worts (*Pinguicula*), and if one end of the bed is gradually sloped, so that the soil becomes merely damp and finally firm, the grass of Parnassus (*Parnassia palustris*) and *Dryas octopetala*, two exceedingly interesting plants, can be established, whilst on the margin can also be grown *Linnaea* and the bog pimpernel (*Anagallis tenella*), two lovely little wildings that for many years I have considered worth growing in shallow pans.

From such a bed of floral gems it is an easy transition to small British rock plants. This, I think, is wonderfully well exemplified in the rock garden at Kew, where the dwarf bog plants are accommodated at the base of the shelving rock. With British rock plants this arrangement would in any garden be an attractive and instructive feature. Space will not permit me to do more than enumerate a few of those plants that may be so employed: *Polygala vulgaris*, with its varieties, *Dianthus deltoides* and *D. caesi*us, *Gentiana verna*, *Primula farinosa*, *Saxifraga oppositifolia*, *Sibthorpia europaea*, thrift (*Statice Armeria*), *Chrysosplenium oppositifolia* in a shady nook, and in a special part prepared with calcareous soil, *Anemone Pulsatilla*, *Chlora perfoliata*, *Gentiana campestris*, *Erythraea Centaurium*, and *Campanula glomerata*—not forgetting here a clump of our pretty little harebell, *C. rotundifolia*, which will grow almost anywhere, even on an old wall.

Our British Sedums, too, should be well represented in such a position. Such species as *Sedum dasyphyllum*, *S. anglicum*, *S. acre*, *S. reflexum*, and *S. rupestre* make, when given a suitable position, bright masses of typical rock plants. I must not omit *Centranthus ruber* in this section; few British plants are so characteristic as this one of rock flora, and, as everyone knows, it is equally at home in the herbaceous border or perched up on some high dry wall or rock, where, in company with wallflowers, snapdragons, and other wall-loving plants, it gives such a vivid colouring to old ruins and rocks.

One more plant let me add as worthy of either the alpine or rock garden, the 'alpine lady's mantle' (*Alchemilla alpina*); the flowers are not vivid, or even curious, but the exquisitely cut leaves, with the under surface of sheeny satin, together with the greenish tuft of flowers, entitles it to a place in any garden where British plants are appreciated.

The fascination of our wild orchid flowers is due, not only to the quaint and unusual outlines and the strange resemblances to other forms of life, but to the delicate range of colouring and, in some instances, to the exquisite scent. Indeed, there is a beauty about these little terrestrial species of orchids, and a fertility of contrivances for pollination, that endears them to all plant lovers; and if they have not the gorgeous colouring of their tropical congeners, they have at least that charm that calls forth some special effort to see them growing in the garden.

One rarely sees British orchids doing well in the garden, unless as at Kew, Glasnevin, and a few private gardens, where some special care has been bestowed on their culture.

The reason is that with few exceptions they are not amenable to ordinary garden culture; anything like disturbance of roots or tubers is fatal to their well-being, and the restlessness of the ordinary herbaceous border with its everlasting topdressing, hoeing, tying up, &c., is exactly

the condition that kills off these plants when they are placed in such uncongenial quarters.

To grow just a very few satisfactorily is far better than to attempt a collection. I suggest the best way to grow British orchids successfully is to make a bed (cut out of turf) in some shady moist part of the garden, and fill the bed with three kinds of soil to the depth of 12 to 15 inches. First, in the most shady part of the bed, make up the soil with plenty of leaf mould, not too much decayed, some peat, and plenty of good river sand, and, if it is easily obtained, some well chopped *Sphagnum*. In this section of the bed can be grown *Goodyera repens*, one of the least known of our native orchids. Given a few handfuls of pine needles to carpet the soil in its vicinity, it will produce its pretty little cream-white flowers during the latter part of July and early in August. It is by no means a showy flower, but its leaves, when fully developed, are very unlike the ordinary orchid leaf, and serve to give distinction and special character to the plant. Not the least interesting trait in the *Goodyera* is its very wide geographical range. It is a very rare plant in the British Isles, occurring only in the East of Scotland, whilst it is found in parts of Mid and North Europe, Siberia, the Himalayas, and North America, where it is known as the 'rattlesnake plantain'—a name that is used also for two other species of the same genus, *G. pubescens* and *G. Menziesii*.

In the same section of our Orchid bed the showiest plants will be *Orchis latifolia* and *Epipactis palustris*. The former is one of the most handsome of wild flowers, and a clump of this plant growing in the wild garden undisturbed for several years forms as ornamental a subject as one can desire. The sub-species, *O. latifolia incarnata*, has more intense coloured flowers and unspotted leaves, and is a most desirable companion plant to the Marsh Orchid.

Epipactis palustris (the Marsh Helleborine) is a distinctly handsome plant when once established, and should be given the dampest corner and planted with just a trace of chalk near the roots. In such a position it will soon establish itself, and its annual crop of quaint whitish flowers will reward any trouble taken in giving it the position it likes.

The surface of this part of our Orchid bed should be carpeted with some very dwarf growing plants, and for this purpose I would suggest a few heaths, the Bog Pimpernel (*Anagallis tenella*), and the Butterworts (*Pinguicula vulgaris* and other species), and the Sun-dews (*Drosera rotundifolia* and *intermedia*).

In the second section of the proposed bed good stiff loam should be the soil. This, with a small proportion of leaf mould, will be a favourable place to grow *Gymnadenia Conopsea*, the sweetest scented Orchid we have, a plant worth cultivation in any garden.

In the same bed can be grown several species of *Orchis*, such as the Purple Orchis (*O. mascula*) and the Spotted Orchis (*O. maculata*), both of which species can be found growing in profusion on the rank clay soil of Middlesex, and within a few miles of London.

O. maculata especially makes a most effective garden plant, and left alone will make a fine specimen plant in a few years. Gerard, in the "Herbal," says of these, "in shape like a fools hood or cocks combe." Evidently this Orchid was a favourite even in Gerard's days, for he

devotes a chapter to it. In north-west Middlesex this species is remarkably variable in colour, so much so that we have it at Stanmore with flowers ranging from almost pure white to pale purple, and a more interesting batch of plants cannot be imagined than these, when they flower in June.

Flowering about the same time and in the same soil is *Orchis Morio* (the Green-winged Orchis), an Orchid that is sometimes mistaken for *O. mascula* when not in flower. When, however, in flower there can be no mistake, as the spreading and sometimes reflexed lateral sepals of *O. mascula* differentiate it distinctly from the hood-like and arching sepals of *O. Morio*.

Another Orchid with green or greenish flowers is the Tway Blade (*Listera ovata*). In such a bed as I have described this plant will grow in the stiff loam, and if the flowers are not particularly attractive there is a quaintness about a finely developed spike that appeals to all flower lovers, and then its contrivances for pollination are simply wonderful, and flowering in one's garden it enhances considerably the value of that wonderful classic, Darwin's "Fertilisation of Orchids," since so large a part of it is devoted to the interpretation of this modest little plant.

One other Orchid I specially recommend for the loam bed—the Butterfly Orchis (*Habenaria bifolia*), a very beautiful and deliciously sweet plant, especially after a shower of rain. I once came upon a wood in North Wales carpeted in places with this species, and the perfume was most fragrant.

On the surface of the bed dwarf British Sedums and Saxifrages will give the necessary carpeting and keep it cool and moist. One precaution here is necessary. In such a bed wire-worms are apt to give unwelcome attention to the fleshy tubers of the Orchis, and, to keep the bed free, carrots should be buried near the plants and occasionally examined for the pests.

In the third part of the bed, soil of a calcareous nature should be used, this should consist of limestone, or chalk, mixed with sandy loam. In such soil Orchids from chalk or limestone soils may be successfully grown.

Orchis pyramidalis when once established in such a soil forms a fine ornamental plant easy to cultivate and lasting well in a cut state. Like several other species of the same genus it is variable in colour—this can be well seen on the chalk downs near Henley-on-Thames.

Another plant worth cultivating in such a position is the Lady's-tresses (*Spiranthes autumnalis*); its interesting little white flowers, twisted like a curl (hence its name), are most welcome in the early autumn after all the summer flowering species have gone. This Orchid, like one or two other of our native Orchids, has the strange habit of disappearing from its usual place of flowering. I know a few plants that grow upon a chalk outcrop on the borders of Herts, where they have grown and flowered for many years, but occasionally one looks for them in vain, and no trace of either leaf or flower can be found; the next season, however, they are there after their long rest.

There are two species of *Cephalanthera*, *C. grandiflora* and *C. ensifolia*, that repay cultivation in chalky soil; the former, the white

Helleborine, is especially conspicuous and ornamental with white flowers and the faintest tinge of yellow, due to the tinting of the lip with lemon-coloured lines. *C. ensifolia*, as its name implies, is a narrow-leaved plant similar to the former, but easier of cultivation when given calcareous soil to grow in.

As in the other parts of the special Orchid bed, a carpeting of small-growing British plants is essential, and on the chalky portion I would suggest such plants as the Sandworts, *Arenaria*, Thyme (*Thymus Serpyllum*), and *Campanula hederacea*.

There are other British Orchids which I have not mentioned, simply because they are not amenable to cultivation, and one naturally does not wish to recommend those species that are either very rare or likely to become so if their cultivation is attempted.

Two Orchids have become almost extinct in this country, the Lizard Orchid (*Orchis hircina*), and the Lady's Slipper (*Cypripedium Calceolus*), and one does not want the odium of having recommended a course likely to reduce other species to the same fate.

There are comparatively few climbers in the British Flora, but as these are so well known and widely distributed, little need be said to advocate their claims to garden cultivation, especially as in every garden the honeysuckle and ivy are to be found. Perhaps because they are so common, the Wild Roses (*Rosa arvensis* and *R. canina*), are rarely found inside the garden fence, yet when they are given the same care as the Ramblers and other garden forms, they are really beautiful plants, not of course suitable for small gardens or for the more "kept" parts, but in some outlying part, on an old tree-stump, nothing more beautiful can be imagined than a full grown plant of the Dog-Rose when in flower.

Next to the Wild Roses, the most characteristic and beautiful climber is the Wild Clematis, or 'Travellers' Joy' (*Clematis Vitalba*). It is deserving of a place in every garden large or small, and with its mode of seed distribution it may truthfully be added it usually gets a place, for few pleasure grounds can be found without the 'Travellers' Joy' draping and wreathing over the boundary hedge, where, first with its flowers, and then later with its silvery and feathery seed vessels, it beautifies its surroundings.

The Black Bryony (*Tamus communis*), is worthy of a place amongst representative British plants, if only for its handsome shiny foliage and attractive berries, so too is the White Bryony (*Bryonia dioica*), which when given a good position, forms a most attractive climber when the fruit is ripe. The best plant of this, our only representative of the Cucurbitaceae, I have seen was growing and covering the side of a house near Ealing, a most uncommon plant for such a position, but very effective and interesting. Other British climbers worth notice are the Hop (*Humulus Lupulus*), the woody nightshade (*Solanum Dulcamara*), and the Wood Vetch (*Vicia sylvestris*). I should like to add that most beautiful of flowers, the Hooded Bindweed (*Calystegia sepium*), but its awful habit of spreading prevents one from advocating its claims to be included in the garden, for, as the Hon. Mrs. Boyle says,* "Only an

* *Journ. R.H.S.* xxvii., p. 166.

unsparing vigilance will keep the beautiful destroyer in check, yet, for me at least, what courage is needed to tear away a thing so utterly lovely as the snow-white *Convolvulus* flower of it is !”

I need say but little with reference to British ferns ; their claims have been so ably and persistently advocated by Mr. Druery that really representative collections of British ferns, their sports and varieties, are to be found in many gardens. There is always some position in gardens, large or otherwise, where a few British ferns seem natural, and with little encouragement they will give most beautiful results.

In many of our public gardens ferns are conspicuous by their absence. Kew, of course, is an exception, where a really good representative collection is kept, properly labelled. If this example were followed in other directions, and special note made of the British character of the plant, it would add greatly to the enjoyment and instruction of the visitors.

May I very briefly refer to the mode of arrangement and planting of the wild flowers I have been advocating ? With the exception of the Orchids, planting in small groups or small masses is the most effective plan. Many of our British plants have small flowers compared with the herbaceous border type of plant, consequently dotting a plant here and there does not give the effect that would be obtained if a small group were planted. Take, for instance, the little blue skull cap (*Scutellaria galericulata*). An isolated plant or two would be passed by almost without notice, but nothing can exceed the striking effect of a group of this delicate blue wilding when growing by the water or in some shady damp spot. Others, too, when seen singly, are decidedly “weedy,” yet when planted in a group, and seen in close association, they are most conspicuous, and form a decided feature in any landscape. It may be objected that few gardens could afford space for this kind of arrangement, and that it is merely another phase of the so-called wild garden, and if so I do not for one moment defend the term, as my idea of a really wild garden is one entirely devoted to wild or British plants.

If, instead of a miscellaneous collection of plants often consisting of those too weedy for the herbaceous borders, groups of our British plants, planted in bold positions, were used, such a garden would deserve its name and would be a feature of interest to all.

The presence of water either in large or small areas affords the best position for such plants as I have noticed, and nowhere are our wildings seen to better advantage than when growing by the margin or in the vicinity of the water.

In conclusion I should like to add one word with reference to the acquirement of wild flowers. The majority of the species mentioned in this paper are easily raised from seed, and this can be obtained during one’s wanderings without in any way endangering the existence of the species collected.

Digging up roots is at the best a very unsatisfactory way of getting together a collection, and, however careful one may be, it is undoubtedly a factor that ultimately leads to the scarcity of the plant collected.

If care is taken to collect seed only, there is little or no danger to the proper preservation of our wild flowers in their natural habitat ; on the

other hand, if one patronized the people who offer in the Press British flower and fern roots, then, one is, I think, guilty, often perhaps unconsciously, of assisting in the destruction of the native flowers of the British Isles, and there is this also to be considered, just as, in other parts of the garden, the most cherished and interesting plants are those given by friends or collected by one's self from various countries, so the wild flowers in your garden will have an added interest if in their collection you have the knowledge that they have been collected mainly as seed, and that your mode of acquiring them has in no way helped to destroy or lessen the beauty of our native flora.

THE CULTIVATION &c. OF CITRUS FRUITS IN THE WEST INDIES.

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INTRODUCTORY.

THE genus *Citrus* supplies us with many well-known fruits of a high commercial value, such as the orange, lemon, citron, lime, shaddock, grape-fruit, &c.

Botanists are by no means agreed upon the classification of these fruits ; some prefer to consider the citron, lime, and lemon as distinct species, whereas others regard them as varieties of the same species (*Citrus Medica*).

As the subject of this paper is concerned more with the cultivation than the botanical classification of these fruits, it will perhaps be more convenient and less confusing to adopt that classification which meets with general approval in the West Indies.

It will be sufficient for our purpose on this occasion to know that the following fruits are to be found growing in Dominica and many of the other West Indian Islands: the Sweet Orange (*C. Aurantium*), Seville Orange (*C. Bigaradia*), Sour Orange (*C. vulgaris*), Bergamot Orange (*C. Bergamia*), Mandarin and Tangerine Orange (*C. nobilis*) ; the Citron (*C. Medica*) ; Lemon (*C. Medica* var. *Limonum*) ; Sour Lime (*C. Medica* var. *acida*), Sweet Lime (*C. Medica* var. *Limetta*) ; Shaddock or Pomeloo (*C. decumana*) ; Grape-fruit, Forbidden fruit, or Paradise fruit (*C. paradisi*).

PROPAGATION.

Citrus trees may be propagated by seeds, budding, grafting, or cuttings. Of these methods budding is the one to be generally recommended and the one usually adopted, except in the case of the West Indian Lime (*C. medica* var. *acida*), this being propagated entirely by seed.

Budded trees possess many advantages over seedling trees. They produce fruit of a superior quality and of a uniform size and shape ; they also bear true to the variety, and produce few or no seeds. Budded trees will bear in four or five years, whereas seedling trees often take ten or twelve. Seedling trees tend to grow erect and produce numerous spines, whereas budded trees make a good lateral spread and produce fewer spines, thereby greatly reducing the cost of gathering the fruit.

Citrus trees raised from seeds are very liable to variation, due no doubt to cross-fertilization. This is perhaps the strongest argument in support of worked trees. On the other hand, propagation by seed should not be entirely discouraged, as by this means new varieties are obtained.

By budding, the grower has also the choice of stock most suited for his particular situation.

NURSERIES.

Owners of Citrus groves should always possess their own nurseries, and, as far as it is possible, raise their own stock. A portion of the intended grove should be selected as the site for the nursery. The plants then raised in these nurseries will be accustomed to the conditions prevailing in the grove when they are planted out in their permanent places, and will suffer little or no check upon removal. It is a well-known fact that before a plant can thrive its root system must adapt itself to the soil in which it is grown; therefore, by selecting a portion of the intended grove for this purpose, the physical conditions of the soil in which the seedling plants are raised will, for all practical purposes, be the same as the remainder of the grove. The root system of the seedlings raised in such nurseries will therefore be of that formation required for the successful growth of the plants in their permanent quarters; whereas if the young plants are raised in a nursery rich in organic matter, and transferred to a grove where the soil is of a stiff nature, they will receive a great check, necessitating a more or less complete change in their formation.

The site chosen for the nursery should be sheltered from heavy rains and high winds. The portion selected for the seed beds should be sheltered from the direct rays of the sun. The soil should be well tilled to a depth of 2 feet, and all lumps carefully broken up. The position should also allow of natural drainage. Beds should then be made 5 feet wide, these beds being divided by a 3 foot walk, soil being thrown from the walks upon the beds to raise them so as to receive a better drainage. Beds wider than 5 feet should not be made. This width allows of the manipulation of the plants without treading on the beds. The usual length for each bed should be about 20 feet; but this is purely a matter of convenience, and should depend upon the size of the nursery as a whole.

The planter must decide for himself what particular stock will best serve his purpose, and in this matter he might be guided to a great extent by the experience already gained by those owners of Citrus groves nearest to his intended settlement, modifying, of course, the advice given for his own particular conditions and requirements. He may be assisted somewhat in this decision by considering the few notes on "stocks" which follow.

Having carefully decided which stock to use, seeds of the perfectly ripe fruit should be obtained and sown in drills 1 inch deep and 2 inches apart in beds previously prepared, the drills being made 6 inches apart, the most suitable time for sowing being about October. These beds will require weeding from time to time. The weeds should be thrown in the walks and trampled under foot.

After each season the beds should be levelled down and the walks forked up. In remaking, the new beds should be made over the old walks, and the new walks where the old beds formerly stood. The weeds which have been thrown in the walks during the year should by this time be fairly well decayed, and should be thoroughly worked into the soil of the new beds.

MANIPULATION OF SEEDLING STOCK.

If seeds are sown in October the seedlings should be ready for transplanting about February or as soon as the early rains set in. The soil should then be thoroughly soaked, and the seedlings pulled *straight* up by the hand. The soil should be shaken from the roots and the seedlings sorted, all the weak and deformed plants being destroyed, and only the most vigorous retained for planting. The roots should then receive a light pruning, the tap root being cut back and the laterals pruned (fig. 88). This stimulates the production of a surface-feeding root system, and prevents the breaking or twisting of the roots when being transplanted. The heads of the young seedlings should also be pruned and cut back about half their length, and the leaves clipped. This is usually done at the same time as the pruning of the roots.

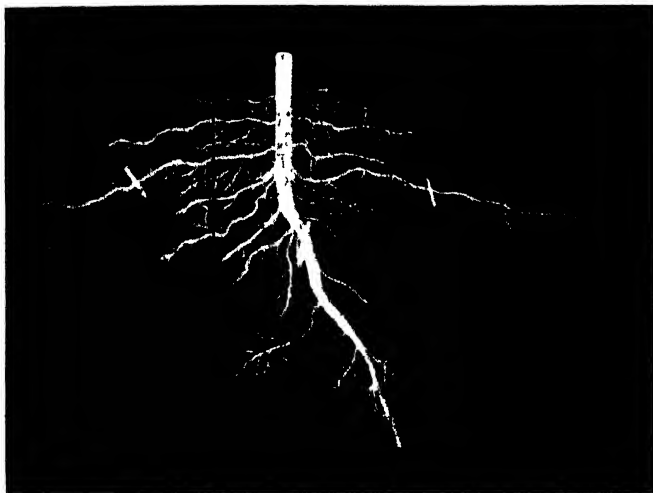


FIG. 88.—ROOT SYSTEM OF SEEDLING STOCK.

Personally, I am in favour of head pruning, and do this a week or so before the seedlings are removed from the seed beds. They then have a better chance of recovering from this operation before undergoing the second. Having been properly pruned, they should be planted in similar nursery beds at distances from 12 to 18 inches apart in the rows, and two rows planted in each bed. Whilst planting they should be held perfectly upright with the left hand, and the soil pressed firmly around them with the right.

Great care should be exercised in seeing that the seedling is not planted any deeper than it originally stood before transplanting. Too much stress cannot be laid on this point, as it is in many cases the entire cause of failure on the part of the plant to grow after being transplanted.

Transplanting having been successfully accomplished, the plants should be allowed to grow undisturbed beyond an occasional pruning of any side branches, so as to keep the growth confined to the formation of

good, strong, straight stocks until about the following October, when they should be cut back to about 8 inches above the soil. If the stocks are in good health new shoots will be readily thrown out. The strongest two of these might be allowed to develop for a couple of months, and then the weaker should be cut off, leaving the stronger to develop. In about four or five months this shoot should have developed to about the thickness of a lead pencil, and should be from 12 to 18 inches in height. It is then ready for budding.

BUDDING.

Budding of Citrus trees is performed in the same manner as for roses or other fruit trees, with one exception, the T cut is inverted thus **⌞**, and the buds pushed upwards instead of downwards. By this method water is prevented from entering the cut and causing the bud to rot. Budwood of Citrus trees may be angular or round. The new growth is usually angular and develops roundness as it gets older; either kind will do for budding, the round being easier, as a rule, to cut; but some budders consider that the young or more angular wood gives best results. For choice one should try to secure budwood from the last ripened growth, and being of not more than one season's growth, endeavour to obtain wood neither too angular nor too round. In cutting the bud the cut should be made deep enough to take a thin slice of the wood as well as the bark. This wood should not be removed from the bud; "wood buds" take much more readily than mere bark buds. A good sharp knife, a steady skilful hand, and a bright day are the essential conditions for successful budding.

Mal-di-goma, or Root Rot, having been known to attack Citrus trees from ten to twelve inches above the soil, resistant stocks should not, therefore, be budded below this height, or the object to be gained by budding on resistant stocks will be likely to be lost. If the bark of the stock does not lift readily in one place, then a little higher up the stem may be tried with advantage.

When the bud has been properly inserted it should be bound round firmly with raffia, and finally wrapped round with budding tape. About three inches of the extreme top of the stock should then be bent down this enables the budder to see at a glance the plants that have been budded. After ten days the tape should be unwrapped and the bud examined, and if found to be growing, the tape should be wrapped round again very loosely to enable the bud to get hardened, and, in the meantime, to give it some slight protection from the sun. The top of the stock should then be bent in half, and as the bud continues to grow this top should be cut away at the bend, thus leaving eight or nine inches of the original stock to protect the growing bud. When the bud has fully emerged from the bark the tape should be entirely removed, and after it has made its second strong growth the remainder of the stock should be cut off close above the bud. Many growers, however, leave this portion of the stock until the plants are removed to their permanent quarters, but this is not necessary, and certainly checks the plant in its quick development of healing-tissue over the union of bud and stock.

Citrus buds are naturally inclined to make two growths from the same bud; this should be watched for and the weaker one removed so as to get the entire strength into the single growth.

STOCKS AND MAL-DI-GOMA.

The following stocks are available for the working of Citrus trees:—The Rough Lemon (*C. Limonum*), Sour Orange (*C. vulgaris*), Sweet Orange (*C. Aurantium*), Seville Orange (*C. Bigaradia*), and Shaddock (*C. decumana*); of these the Seville and Sour Oranges, and the Rough Lemon have given the best results in general cultivation in the West Indies. These give the planter a fairly wide range of choice of the stocks most suitable for his particular purposes.

Stocks should, in the first instance, be chosen with a view to their immunity from disease. Mal-di-goma, or Root Rot, which broke out in the groves in Europe some sixty years ago did considerable damage to the trees, and has now spread to almost every Citrus-growing region throughout the world. Some stocks appear to be very susceptible to the disease, whereas others are, to a greater or lesser degree, immune. Therefore, disease-resisting stocks should be chosen, and not budded lower than one foot above the soil. This disease, however, can be kept in perfect check if care be taken to see that there is effective drainage, and that sunlight is allowed a free entrance to the base of the stems.

The Sour Orange is a good hardy stock, and is not subject to root rot. It does not do well on a dry soil, but thrives on good retentive soils such as are found in forest or interior lands.

The Washington Navel Orange thrives remarkably well on this stock, as does the Grape fruit. It is more extensively used as a stock than any other for Citrus trees in the West Indies.

The Seville Orange, like the Sour, is immune from root rot, and thrives best at low altitudes, and requires a larger amount of root moisture than the Lemon or Sour Orange.

The Rough Lemon is not suitable for low altitudes; it thrives best on high, dry soils. It is considered by some to be unaffected by root rot; by others it is said to be subject to the ravages of this disease. The root system of the Lemon being specially adapted to high and dry situations makes it unsuitable for the lower altitudes where root rot is prevalent. Should this stock, therefore, be used in low situations where large quantities of moisture are present it is quite conceivable that the Lemon would prove a failure and fall a ready victim to this disease. This is possibly the cause of these conflicting opinions. This stock possesses a good foraging root system, which makes it very serviceable in poor soil containing little plant food. The growth of trees on this stock is much more rapid than on the Sour or Seville Orange. The Grape fruit does exceedingly well on this stock.

The Shaddock is also a good hardy stock suitable for dry soils, and proves a good substitute for the Rough Lemon in every way.

The Sweet Orange is not as hardy as the sour, but the growth of trees on this stock is more rapid than on the sour. This stock is, however, susceptible to root rot.

After carefully considering the various merits of these stocks, and having made himself thoroughly acquainted with the nature of the soil and the varying climatic conditions existing in the region where he desires to establish his grove, the planter should experience little difficulty in securing the most suitable stock for his particular purpose. In the course of these remarks on stocks I have made no particular mention of the influence of the stock on the scion. That the stock does exert an influence over the scion cannot be doubted, both upon the growth and productiveness of the tree and the flavour of the fruit.

As so little reliable evidence is obtainable at present, and that so conflicting, no good purpose could be served by discussing it in this paper.

VARIETIES.

Before planting a grove the planter must first make himself acquainted with the requirements of the market for which he intends to cater, and he should also possess a thorough knowledge of the qualities of the fruits he purposes growing, giving due consideration to their flavour and general shipping qualities, whether early, medium, or late varieties are required.

Having accomplished this he can then make a suitable selection for his particular purpose. If he desires to confine himself to the cultivation of one good all-round variety of orange, the Washington Navel cannot be too strongly recommended; this is a seedless orange of good flavour. There also exist in some of the West Indian Islands unnamed varieties of Sweet Orange, which often possess qualities "superior" to many of the more recently imported varieties; such oranges usually go by the name of 'Common Sweet Orange' (fig. 89), and large quantities are shipped each year and find a ready sale in the European markets.

Early fruiting varieties of the ordinary orange are 'Parson Brown' and 'Boone's Early.' If early fruiting varieties of the ordinary sweet orange are required, 'Parson Brown' and 'Boone's Early' can be thoroughly recommended, whereas 'Valencia Late' makes an excellent late variety.

Mandarin and Tangerine Oranges.—The 'Satsuma' is a good early fruiting variety of the Mandarin, and the Tangerine 'King' cannot be beaten as a good all-round late fruiting variety.

Grape Fruit.—The 'Triumph' and 'Jamaica' are varieties difficult to surpass either for their general health or prolificness. (Fig. 90.)

Lemons.—The 'Villa Franca' variety can be recommended for general cultivation.

SELECTION OF SITE FOR GROVE.

The final success or failure of an orange grower is often decided by the choice of site. Oranges and Grape fruit thrive well up to an altitude of 2,500 feet, the most suitable altitude, however, being from 800 to 1,200 feet. The site chosen should be within easy reach of the coast, and should afford good facilities for transport; a gentle slope with a south or south-westerly aspect, well sheltered from prevailing winds, should, if possible, be chosen.

Artificial wind-breaks should be planted if natural ones are not obtainable ; but whenever the native growth is sufficient for this purpose it should be handled in such a way as to fulfil best the desired object. A good wide deep ditch should be dug between these wind-breaks and the first row of oranges, to prevent the roots of the trees penetrating into the grove.



FIG. 89.—ORANGES GROWN IN DOMINICA.

The soil should be of an open nature, well-drained, and rich in organic matter and phosphates. An extremely dry soil should not on any account be used unless irrigation be possible, and heavy soils, through which water does not percolate freely, should also be avoided.

The ideal soil is one of a sufficiently open nature to allow air and water to penetrate freely, and one that will retain sufficient moisture without producing stagnation.

The rainfall should be from 100 to 200 inches per year.

Forest land in Dominica can be readily cleared and prepared for planting at a very low cost. The timber is felled, and the branches lopped and burnt in heaps. Logs that are too large for burning may be left to decay in suitable places where they will not interfere with the planting of the grove.

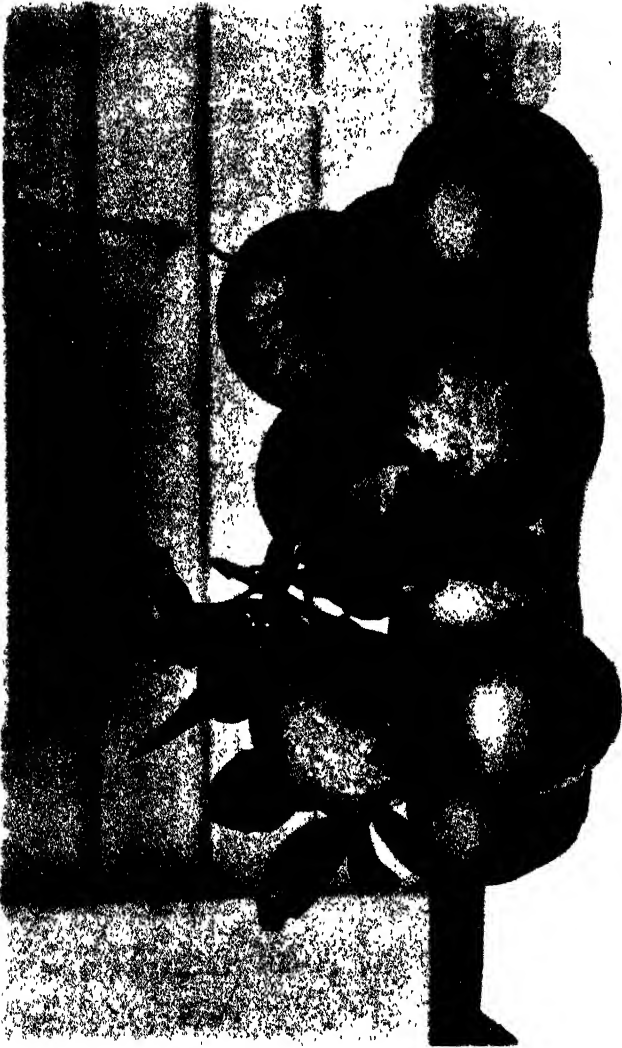


FIG. 90.—GRAPE FRUIT GROWN IN DOMINICA.

PLANTING OUT AND GENERAL CULTIVATION.

Citrus trees should be ready to transplant into the grove in from six to nine months after budding. They would then be from fifteen to eighteen months old. They should not, however, be transplanted until two good strong shoots have been made, and a few days previous to removal the heads should be cut back. They should not be trans-

planted when the ground is hard and dry. The best time for transplanting is at the first sign of growth; one is then sure that the sap is active. Death often results through moving when dormant.

All the twisted and bruised roots should be carefully pruned; this will simplify the actual planting operation, and prevent loss of time taken by the healing of bruised and torn roots.

If the plants have to travel some distance they should be tied in bundles of fifty. The roots should be well watered, and then sprinkled with moist soil and wrapped in banana trash—previously soaked in water—and finally wrapped and tied up in coarse baling, the top of the bundle being left open. In this way the plants will travel safely overland for several days without much harm resulting. Budded Citrus plants have a tendency to spread; therefore plenty of space should be allowed for lateral development. For general Citrus cultivation a distance of 25 feet each way should be allowed.

Stakes with white painted tops should be placed at these distances, care being taken to see that the lines run straight, as this will naturally add to the general appearance of the grove in later years.

The soil within a circumference of three feet of these stakes should be thoroughly forked to a depth of $1\frac{1}{2}$ feet and cleared of all roots and stumps. The soil in these circular beds should be slightly drawn towards the stake so as to raise the centre about one foot above the surrounding level. The plant should be set on this raised bed and all the crown roots should be carefully spread out in their natural positions. The surface soil should then be drawn from the inner spaces to the plant and pressed firmly around the roots, which should be covered to a depth of two inches.

Great care must be taken to see the plants are not planted too deeply; nothing is more fatal in Citrus cultivation than this. Such planting results in numerous evils; the plants are slow to grow, often dying back and falling easy victims to the ravages of scale pests. If care is taken to see that the highest crown root is not lower than an inch below the surface of the soil this evil will be obviated. A piece of spun-yarn should then be passed round the base of the plant and attached to the stake, thus preventing the plant being loosened by the wind.

The grove must be kept free of weeds: this may in a great measure be accomplished by the growing of catch crops, such as Sweet Potatoes, Cassava, Pigeon Peas, Corn, Plantains, and Bananas, &c. Such crops, however, must not be grown where they would prove detrimental to the Citrus plants.

The circular beds in which the trees are planted must be carefully hand weeded. No implement should be used for this purpose, as it would be likely to injure the roots; the weeds, together with others, should be spread thickly around the roots of the plants to form a good mulch which will protect the young roots from the direct rays of the sun and keep them moist.

The circles should be widened from time to time by forking, thus enabling the root system to develop with the head of the plant.

A sharp look-out must be kept for all suckers which spring from the stock, and these must be immediately removed. Cases have been known

where suckers have developed unrecognised until the fruiting period, when, of course, it was too late to remedy the evil. This is one of the reasons why it is much better for the planter to bud and raise his own stock instead of purchasing from nurseries, for then he knows exactly at what height the union was made.

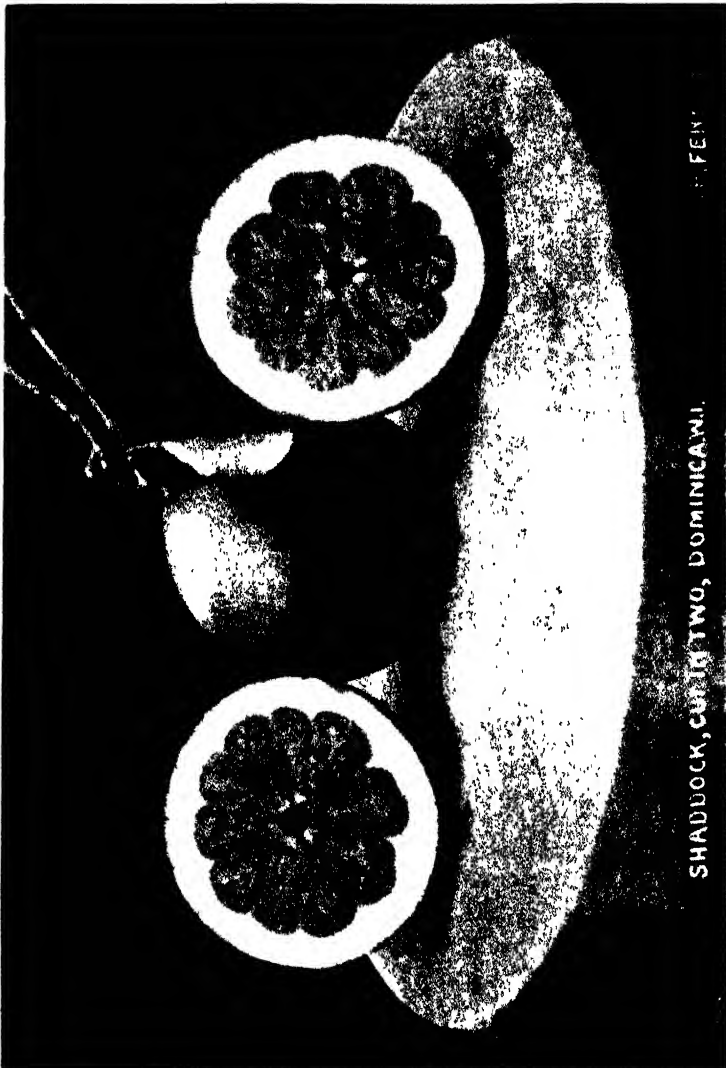


FIG. 91.--SHADDOCK GROWN IN DOMINICA.

Beyond the pruning out of all dead wood, which, of course, should be done immediately, and the removal of branches too near the ground, very little pruning is required during the first two years. The object to be kept in view in pruning a Citrus tree is the removal of all interior branches which would prevent free circulation of air and light.

When early fruiting is desired the trees should be thoroughly pruned in November, when all fruits, dead wood, and dying branches should be

removed. The trees are then stimulated into flower so as to produce fruit in the months of July, August, and September. If the trees have been planted high and with a care to drainage, no manure beyond the occasional mulching of weeds and bush will be required.

INSECT PESTS OF CITRUS TREES.

Citrus groves are seldom free from scale pests; the trees may be often noticed to assume a sickly yellowish appearance and die back. This may, in some cases, be due to uncongenial conditions of the soil, etc.; but in most it is due to the attack of scale pests. The most injurious of these are the orange snow scale, *Chionaspis citri*; the small snow scale, *Chionaspis minor*; the orange mussel scale, *Mytilaspis citricola*; and the red spotted scale, *Aspidiotus ficus*.

In dealing with the question of pests it should be remembered that it is invariably the weakest trees that are most liable to be attacked. Every effort should therefore be made to keep the trees in vigorous health. If due attention has been paid to the proper planting and general cultivation very little trouble will be experienced in this direction. The trees should be kept properly thinned out so as to allow the free action of air, sun, and rain; this will go far to keep the trees free from scale pests. Scale pests are always most abundant in overcrowded plantations.

In some Citrus-growing countries the groves are freed from scale pests by fumigating the trees with hydrocyanic acid and carbon bi-sulphide. In the West Indies spraying has always had the desired effect, and is more readily carried out, needing only a suitable sprayer, of which there are dozens on the market to suit all requirements. The Imperial Department of Agriculture has issued a special pamphlet* dealing with the scale pests of the West Indies. In it six different recipes for washes are given, each possessing its own special advantage. For general use the following—if made in strict accordance with the instructions—cannot be beaten or too highly recommended.

KEROSENE EMULSION (HARD SOAP).

Dissolve $\frac{1}{2}$ lb. hard soap in one gallon of boiling water. Add 2 gallons of kerosene to the hot liquid and immediately churn with a syringe or force pump till the mixture becomes creamy. This is the stock solution. Make up to 83 gallons. Use only rain water, or soft water (*i.e.* without lime etc.).

GATHERING AND QUAILING.

All Citrus fruits should be cut from the tree—not pulled—leaving less than one-eighth of an inch of stem to each fruit. There are many forms of fruit clippers on the market, one of the best being known as the "Snyder's patent"; this clipper is provided with a spring which holds the cut fruit by its short stem. The blades are also rounded to prevent the fruit from being punctured. Fruit growing on the high branches should be gathered with a fruit picker; this consists of a pole the end of which is fitted with a hook clipper under which is attached a bag made of

* Scale insects of the Lesser Antilles, Part I. Pamphlet series, No. 7.

netting into which the fruit falls when cut; it should then be removed to padded baskets—baskets in which a sack has been placed will answer the purpose. Great care must be exercised in the gathering of the fruits. All that fall to the ground must be discarded. The slightest rough handling at the time of gathering will, in all probability, cause bruising, which would not, unfortunately, manifest itself for several days afterwards. The slightest bruising of a fruit will lead to decay, and should such a fruit be packed with sound ones it will, in every probability, mean the loss of the entire box of fruit. Fruit should therefore be handled as little as possible and more carefully than eggs.

Citrus fruits should only be gathered on a fine dry day, and must not in any circumstances be packed as soon as gathered. They should be laid out in single layers in drying trays in a cool airy shed, to allow of the evaporation of the surplus moisture from the rind. The rind will shrink, and, in consequence, there is little further danger of bruising if ordinary care be taken. The fruit is then in a suitable condition to withstand the pressure of the packing without damage.

Oranges should be picked when quite mature and upon the appearance of the first tinge of yellow. If gathered before they are quite full they will in all probability shrivel, and arrive at their destination in a green-yellowish state; such a colour greatly diminishes the pecuniary return. The rule to be observed in gathering is to give the oranges just sufficient time to colour thoroughly by the time they reach the market.

Lemons require different treatment from oranges. They should be cut when from 2 to 2½ inches in diameter and while still green. They will then be quite hard, and possess a fairly thick rind. The market demands an average-sized fruit, ranging from 250 to 300 to the box, and possessing a thin rind and an abundance of juice. Such qualities are obtained by carefully curing the fruit. This process reduces the thickness of the rind, making it tough and less liable to bruise, and at the same time increases the juiciness of the fruit.

When gathered the fruit should be carefully washed to remove any dirt and to improve its external appearance. It should then be laid aside for a few days to partially quail, and then be placed in boxes lined with paper and stacked in a darkened portion of the fruit room. Each box of fruit should be sorted at intervals of three or four weeks, at which time any unsound fruit should be removed. In about eight weeks the fruit should have developed the familiar pale straw colour, and be in a marketable condition. If the curing has been carefully carried out and good storage is given, with an occasional sorting for unsound fruit, lemons can be kept for many months and shipped when the market is favourable. There is very little demand for the larger-sized lemons, so the fruit should not be left on the trees to colour.

Grape-fruit and Shaddock require about the same length of time for quailing as the orange. They should be allowed to ripen before being gathered, and should then be of a pale straw colour. They will remain naturally on the tree a long time after they are ripe without any apparent deterioration.

Citron.—The fruit is commercially valuable only for its thick rind from which is prepared "candied" or "preserved peel." The fruit should

be picked when fully developed and while in its green state. It should not be quailed, but used fresh.

GRADING, WRAPPING, AND PACKING.

Each variety should be kept separate, and the fruit must be graded uniformly. To obtain uniformity in size a grading machine should be used. Many grading machines are upon the market, each possessing its own peculiar advantages. They are mostly, however, of very simple construction, and a useful grader can be made in a few hours by any ordinary carpenter. Every grading machine should allow of the fruit being graded

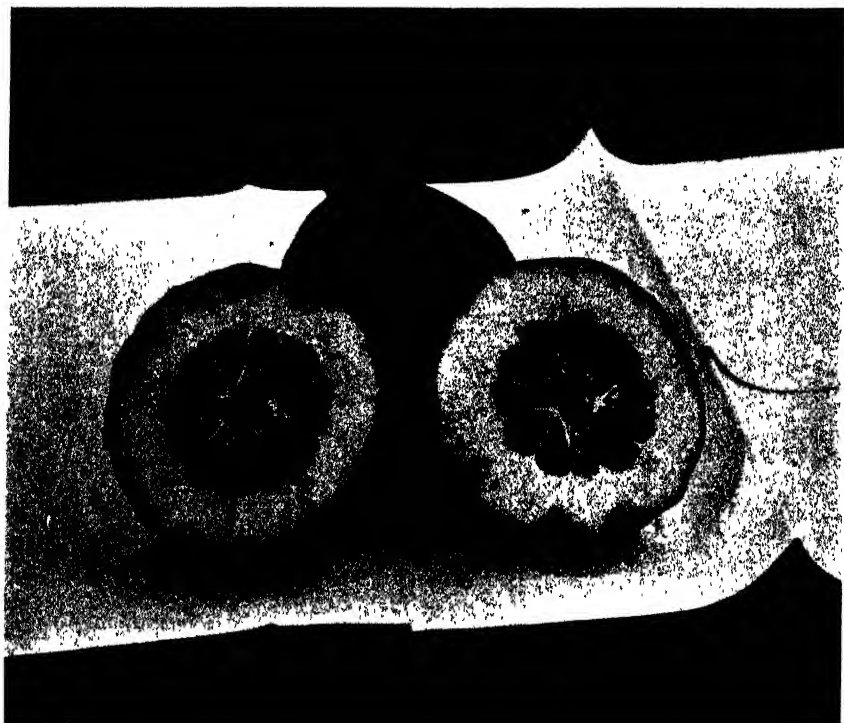


FIG. 92.—CITRONS GROWN IN DOMINICA.

in the standard sizes known as 96, 112, 126, 150, 176, 200—this represents the number of fruits that can be safely packed in the standard orange box. In addition to uniformity in size there should be uniformity in colour, shape, and quality. Such details as these cannot be overlooked with impunity by any grower.

Uniformity in every detail should be constantly aimed at.

When the fruit has sufficiently quailed it should be wrapped in tissue paper. Special wrappers made of the best manilla paper, and cut in suitable sizes for wrapping the standard size fruit, can be easily procured. Each wrapper should bear the grower's brand, and, if careful attention has been paid to details throughout, it will be but a matter of time before that particular brand is sought for with confidence on the market.

The standard box for oranges, grape fruit, and lemons is 27 inches by 12½ by 12½, with a centre partition of 1 inch thickness. This centre partition bears the weight of one-half the fruit when the box is placed on end, thus protecting the bottom layer of fruit from the great pressure to which it would otherwise be subjected. The boxes will accommodate from 96 to 252 oranges, grape fruit 48 to 80, and lemons, 252 to 300. The most desirable sizes for oranges are 150 to 176 to the box.

When the fruit has been wrapped it should be carefully laid in layers in standard boxes, each layer of fruit alternating with the row below ; this method of packing gives greater elasticity to the whole, thus enabling them to withstand rougher handling in transit.

When the box is full the top layer should protrude about ¾ inch above the top of the box. The cover should then be placed on the top, and gentle pressure will bring it into position, when it can be securely nailed. In this way a box of firmly packed fruit is obtained. The box should then be stencilled at both ends, showing the estate mark or brand, together with the number of fruits in each box.

INDUSTRY.

Citrus fruits to the value of £98,410 17s. 6d. were exported from the British West Indies last year. Of this total Jamaica contributed £96,697 4s. 0d., Trinidad and Tobago combined £1,047 ; Dominica £666 ; Grenada 13s. 6d.

It will be seen by the above figures that with the exception of Jamaica the cultivation of Citrus fruits on anything like a commercial scale is still in its infancy. These figures, however, do not show the amount of attention that has been paid to this industry in some of the smaller islands during the last seven or eight years.

In Dominica alone over sixteen thousand Citrus trees have been planted out during this period, occupying an area of about 150 acres, and steady progress is being made in this direction year by year. The trees are in a most flourishing condition and many are now commencing to bear, so that in a very short time the results of this labour should show itself on the exports of the island.

It has now been proved that good marketable oranges and grape fruit can be grown in Dominica.

A fair average seven-year-old orange tree should produce one box of good shippable fruit, allowing for wastage. Some trees are shy bearers, so that an acre containing one hundred trees should not be expected to yield more than sixty boxes of good fruit, and this is a reasonable return after seven years. As the trees advance in age their productiveness increases until the yield is doubled or even trebled.

In Dominica Crown land suitable for Citrus growing can be obtained at 12s. net per acre. Labour being cheap, an acre of oranges can be thoroughly cultivated at a cost of £3 10s. 0d. to £3 15s. 0d. per annum.

Twenty-five acres of oranges can be established up to seven years old for about £1000 ; this does not include cost of land.

Navel oranges will fetch from 10s. 6d. to 12s. 6d. per box in the London and Canadian markets up to Christmas. Ordinary oranges—not

seedless—can be shipped up to the first week in October, and will fetch 8s. to 10s. 6d. per box. It does not pay to ship to the United States, on account of the prohibitive duty of one cent per lb., which amounts to 3s. 6d. per box.

The following statement gives the exact cost of marketing oranges from a grove situated in the interior of Dominica to Covent Garden Market, London :—

	£	s.	d.
Returns from 60 boxes @ 10s. 6d.. . . .	31	10	0
Expenses per box—			
Picking, $1\frac{1}{2}$ d.; cleaning, 1d.; grading, $\frac{1}{2}$ d.;			
wrapping, $1\frac{1}{2}$ d.; paper, 3d.; box and nails,			
9d.; making box, $\frac{1}{2}$ d.; hooping and stenciling,			
2d.; cartage to port of export, 5d.;			
export duty, 2d.; boatage, 2d.; freight to			
London, 1s. 7d.; commission in Roseau,			
Dominica, 2d.; expenses in London, 1s.			
Total, 5s. 1d.			
	£	s.	d.
Expenses of cultivation of an acre	3	15	0
Expenses on yield of 60 boxes from an acre . .	17	10	5
		21	5 5
Profit	£10	4	7

This statement is the actual practical result gained after the seven years' working, and as the trees advance in age their productiveness increases, and likewise the profits in due proportion.*

The following are a few ways in which Citrus fruits may be prepared for eating :—

GRAPE FRUIT.

Cut the Grape fruit in half; carefully remove the core and seeds and with a sharp knife loosen the fruit from the rind, but do not take it out; fill the hole left in the centre with sugar and allow to stand for a little while, when it will be ready to be served.

The addition of a little liqueur in each half of the fruit is a great improvement, and it can be served with crushed ice.

It is generally served at the beginning of meals, and is considered to be an appetiser.

SHADDOCK.

This fruit is not generally liked, but the rind makes a delicious preserve, and is prepared as follows :—

Remove the rind of the Shaddock very thinly, then cut the thick pulp, which surrounds the fruit, into sections and put them to soak in cold water for twelve hours.

* I am indebted to Mr. Scully, who, together with Mr. (now Sir) Henry Hesketh Bell, late Administrator of Dominica, were the pioneers of the Citrus cultivation in the interior land of Dominica, for the statement of expenses and profits incurred and realized in this industry.

Remove them from the water and gently press the pieces to get all the water from them ; great care must be taken in doing this as the pieces are apt to break, especially after they have been boiled. Put the pieces of the pulp to boil in plenty of cold water, and allow them to boil until they are tender, remove the water from the pieces of pulp, then weigh, and to every pound of fruit allow 2 lb. of sugar.

Place the sugar in a preserving pan, and when the syrup has boiled to a thick consistency put in the pieces of pulp and allow it to simmer gently until all the syrup has been absorbed. The pulp should look transparent.

Remove very carefully and place on a dish and sprinkle with pounded sugar and allow to dry, then store.

If preferred, the rind can be left in syrup, but more sugar will be required.

The Sour and Seville Orange rind can be prepared in the same way and makes a delicious preserve, but 1 lb. of sugar will be sufficient to each pound of rind, and there is no need to soak the rind ; the addition of a little of the juice just before removing from the fire will be found a great improvement.

This is usually served as a preserve in the jelly which is formed round it, but if preferred the pieces can be dried.

Put a little of the jelly between two pieces of the Orange rind, then dry as Shaddock.

In "Florida Fruits" Miss Helen Harcourt gives the following directions for preserving Citron :

CITRON.

Dried Citron for home or market :—Pick the fruit when green, just as it comes to maturity, cut into four or six pieces, soak in clear water containing a little alum and a few handfuls of green grass (Guinea preferred) or the leaves of the Citron tree ; pour this off, and boil half an hour in the syrup, then weigh the Citron and add an equal weight of white sugar to the syrup ; dip the Citron into the latter two or three times ; dry in the sun one day ; the second day fill the cavities of the Citron with the syrup, and continue to expose to the sun until thoroughly dry. This makes an excellent article for commerce, being of superior quality to that sold in the stores at 50 to 60 cents per lb.

Preserved Citron.—Never use ripe Citron in any shape ; it will not dry or make a good preserve. Take green Citron, full-grown but young and tender ; cut into four pieces and take out the pulp and seeds ; lay the Citron in salt and water for twenty-four hours ; take it out and scald it two or three times until the bitter is extracted ; then make a moderately thick syrup, and boil the Citron in it gently until clear and translucent ; then flavour syrup with lemon juice, all-spice berries, stick cinnamon, or root ginger.

THE OLD GARDENS OF ITALY.

By J. CHEAL, F.R.H.S.

[Lecture delivered November 24, 1908.]*

THE Italian love of gardening dates from an early period. Roman generals in the zenith of their power, no doubt, brought home from Eastern countries which came under their sway marvellous tales of the gardens of Assyria, Babylonia, and Egypt.

It was probably this that fired the imagination of Lucullus, and led him to make the magnificent garden at Naples described by Pompey. Lucullus also laid out other gardens in different parts of Italy, and was probably a pioneer in the sumptuous style of gardening which became so prevalent at a later date. He not only designed magnificent gardens, but is said to have introduced into Italy many plants and fruits, especially the peach, apricot, and cherry. Greek architecture also impressed its influence on Roman design.

The Emperor Hadrian early in the second century seems to have greatly stimulated the taste for architecture and horticulture. He was not only a great general and traveller, but an insatiable collector, and enriched his magnificent villa and gardens at Tivoli with a wealth of art treasures brought from the East and South, and especially from Egypt. His villa he designed on the grandest scale for the entertainment of his courtiers and friends.

Pliny the Younger, about the same time, not only built many villas and designed gardens, but left copious descriptions of some of these, which give a good idea of the gardens of the period.

For several centuries during the decline of the Roman power the love of gardening, or at any rate the enjoyment of its luxuries, also declined. There was a great revival in this direction, however, about the close of the fourteenth century. A great impetus to gardening seems to have been given by Lorenzo de' Medici, a friend of Michael Angelo, and indeed the whole family of Medici were enthusiastic gardeners, and they had much to do with the creation of the beautiful villas and gardens around Rome and Florence. During the period of the Renaissance, zoological specimens were also introduced into gardens and parks, which were stocked with collections of birds and animals.

At this period wealthy senators, merchants, and Church dignitaries seem to have vied with each other in the creation of charming residences and gardens, all the arts of the architect, the sculptor, and the gardener being employed in the production of the wonderful gardens of the period, many of which can be seen to-day; some in varying stages of decay, others still maintained and preserved with great care.

* This lecture was illustrated by a large number of beautiful pictures from photographs taken by the lecturer, only a very few of which can be reproduced here, and the notes given refer mainly to those gardens we are able to illustrate.

The natural beauty of the position chosen, the abundance of water, the excellence of the climate, all lent themselves to the production of some of the most glorious effects that could be produced by a combination of art and Nature. (Fig. 94.)

The style adopted was, of course, largely formal and geometrical with terraces and parterres, fountains and cascades, temples and statuary, avenues, and pergolas in endless variety.

The climate also favoured the production of a wealth of trees, fruits, and flowers, which afforded not only a feast to the eye and the palate, but filled the air with delightful perfumes. The shady walks, avenues, and grottos afforded cool retreats in the hottest weather, whilst the rippling of the cascades, the splashing of the fountains, and the singing of the birds completed the charm of these retreats.

The VILLA DORIA was, in the days of its prime, a charming domain. The requirements of modern Genoa on one side and the harbour on the other side have, however, very much cramped the garden. The portion left, though small, is of excellent design. A number of terraces lead from the villa to the gardens below, and these are noted for their long tessellated slopes, which are laid in beautiful mosaic instead of being formed into steps.

A portion of the broad terrace, with fine stone balustrades, facing the harbour, still remains, as well as a very fine fountain, the central figure of which is intended to represent Andrea Doria, one of the early owners, as Neptune driving a team of sea-horses, from whose nostrils jets of water are spouting, and he is poising in his hand a trident from the points of which also water trickles.

The suburbs of Florence abound in ancient villas and gardens. One of the small but interesting spots is VILLA DANTE, situated on the old road to Fiesole. It was the home of the poet Dante, and a great part of the villa has been preserved since the fifteenth century, so that it retains its original aspect. An open corridor extends round a central courtyard, where is the old well-head, with medallions on either side, of Beatrice and Dante. Bed-rooms open from the corridor, and one of these is still called "Dante's Room," and is preserved intact. From the outer balcony or Loggia lovely views are obtained of Florence. The garden is well maintained by the present owner, Signor Bondi, well known as a maker of terra-cotta vases and other art ware.

VILLA PALMIERI is one of the prettiest and best preserved of the Florentine gardens. There is a grand approach from Florence, rising by winding ascents to the terrace in front of the villa. This is surrounded by a fine balustrade set with urns and statues, whence glorious views of Florence, with its domes and towers, and the surrounding hills away beyond to the valley of the Arno, are obtained.

A double flight of circular stairs leads to the gardens below, which are laid out with a number of different enclosures with fountains, pools, and beds and borders of flowers. One of the enclosures is flanked by a level wall with open arches, through which you look across the fish-pond below to the gardens opposite and to lovely views beyond.

The VILLAS PETRAJI and CASTELLO in the vicinity of Florence are two Royal Palaces, the gardens of which adjoin one another. In the

grounds of the former is a most beautiful fountain, surmounted by an exceedingly fine bronze female figure representing Florence wringing water from her hair (fig. 98). Another remarkably fine fountain is found in the Villa Castello representing "The Wrestlers." Above this fountain is a wide terrace and orange garden, and from it a glimpse of the villa is obtained in the background.

The VILLA BOBOLI is one of the Royal Palaces, with an art gallery attached to the Pitti Palace. The grounds are open to the public on certain days. It stands on a rather steep hill commanding lovely views of Florence with its Campanile and Duomo. A raised gallery or terrace projects from the Palace towards the gardens on which is a beautiful



FIG. 93.—FOUNTAIN AT VILLA PETRAJA.

fountain (fig. 95). From this terrace the Royal party witnessed the games in the fine amphitheatre in front. This is arranged in the usual style in a semi-circle, with six tiers of stone seats, relieved at intervals with statuary and backed up by masses of Italian cypress, giving a beautiful setting to the statuary. In the centre of the lawn is a very fine porphyry basin with an Egyptian obelisk. The large sloping area below the amphitheatre is planted as a thicket of ilexes, amongst which are good numbers of walks with the ilex foliage overhead, and through the centre is a bold cypress avenue leading down to the "isolotto" or miniature lake. A gateway terminates the avenue, having a fine pair of stone piers surmounted by goats.

The lakelet is surrounded by a broad flagged promenade, with many stone seats and fine pieces of statuary. The island in the centre is



FIG. 94.—THE WATER TEMPLE AT VILLA BORGHESE

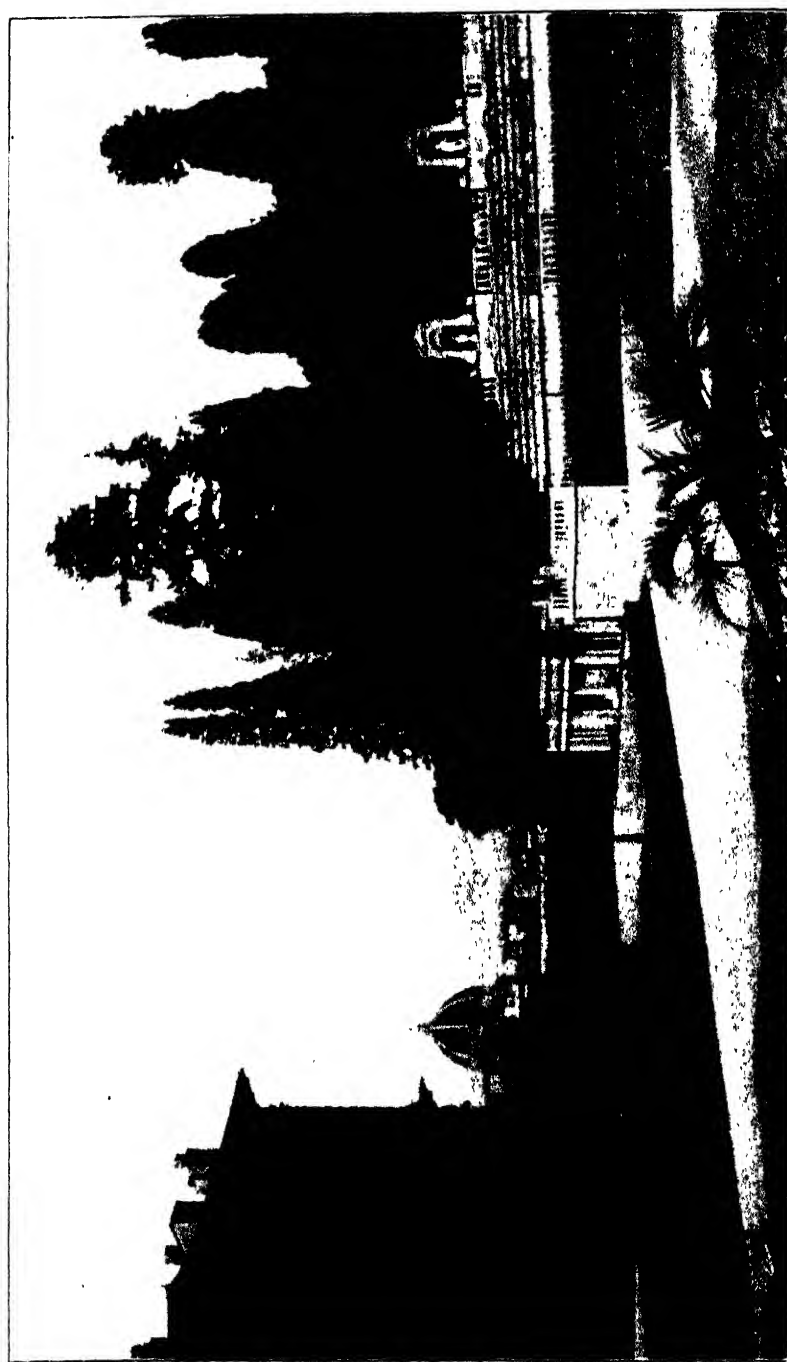


FIG. 95.—Terrace at Villa Bonola.

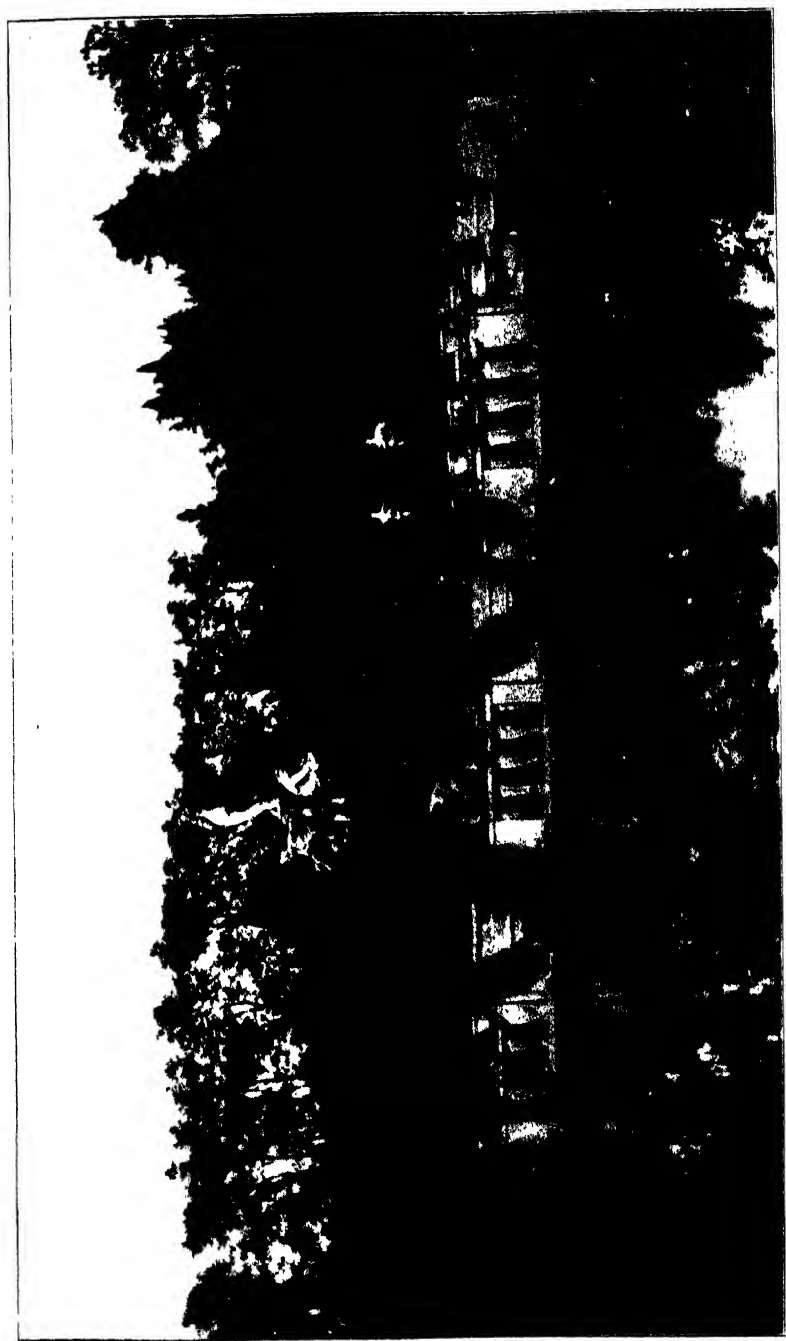


FIG. 96 THE LAKE AT VILLA BORGHESI.



FIG. 97. — ISOLA BELLA, LAKE MUGGIOROF.

approached by two stone bridges and the margin is surrounded by a balustrade of excellent design (fig. 96), relieved at intervals by graceful openings, in which are placed large Roman pots with orange and lemon trees, which fruit profusely. In the centre is a huge fountain with a fine figure of Oceanus.

A number of statues and smaller fountains of quaint designs are placed round the margin of the lake, and in the water itself swimming horses with their riders, beautifully sculptured in stone.

The whole place forms one of the finest examples of Florentine gardening of the sixteenth century.



FIG. 98.—TERRACE AT ISOLA BELLA.

The wonderful garden of ISOLA BELLA on Lake Maggiore is of later date than the others, and in some ways is a grotesque imitation of the earlier period, but it is yet a marvel of labour and skill. It appears to have been a rocky, barren island, 16 acres in extent, until taken in hand by Count Borromeo, who conceived the idea of converting it into a garden, and he certainly succeeded in producing some marvellous effects (fig. 97). The whole island, excepting the area occupied by the villa, is laid out in ten terraces, rising to a high parterre in the centre 100 ft. above water-level. This is flanked at one side by a neat orange garden and a somewhat grotesque theatre of Hercules. Many beautiful terraces and stairways lead to the parterre; this and the terrace walls are enriched with a great variety of statuary, urns, and stone vases. (Fig. 98.)

Two pavilions are erected at the southern end, between which steep terrace walls and a succession of stairways lead to the broad terrace or flower garden.

The formation of the beds is marked out in box edging, and many are laid out with different coloured granite in place of flowers, giving a somewhat tawdry look to the whole. Nevertheless there are many beautiful flowers; roses simply luxuriate, and the whole island is fragrant with their scent and that of many climbers and flowering shrubs. There are many fine trees on the island, which add to the general beauty and afford grateful shade, including cypresses, cedars, ilxes, magnolias, oleanders, sago palms, breadfruits, and camellias, besides oranges, lemons, almonds, pomegranates, and olives.



FIG. 99.—CYPRESSES AT VILLA D'ESTE.

One of the most interesting and extensive of the ancient villas in the suburbs of Rome is the VILLA D'ESTE, built in 1549 by Cardinal d'Este; an immense amount of labour and wealth must have been expended in excavating, levelling, and raising the wonderful terraces to be found here. An idea of the position can be obtained from the picture showing the upper terrace, the position of which is most favourable, commanding views of the lovely hilly woodlands surrounding (fig. 99), streams and waterfalls below, and away beyond the rolling plains of Campagna. The picture gives a good idea of the effect upon the landscape of the graceful Italian cypress.

Below this terrace is the Fountain of Dragons, which even in its present decaying condition shows clearly its former elegance. Extending

in a parallel line below the long terrace is the gallery of the Hundred Fountains, which was apparently unique in its conception.

At the end of the gallery is a pile of ruins, still interesting, and supposed to be a model of ancient Rome.

In the immediate vicinity of Rome, and on one of the 'Seven Hills,' is the entrance to VILLA BORGHESE, which has long since passed into the hands of the city and is now a public park, and in adapting it to public requirements much of its ancient character has been lost. Still there are some very interesting features remaining, probably the prettiest being the water temple (fig. 94).

The VATICAN GARDENS are entered by the side of the famous St. Peter's, and are bounded on the west by the great block of the Vatican



FIG. 100.—IN THE GARDENS OF THE VATICAN.

buildings. Passing up the inclined road you reach the terrace overlooking a great parterre, with possibly the finest views of the dome of St. Peter's to be obtained in Rome. The whole parterre is divided into compartments, with straight walks bounded by box edging and rows of oranges and lemons in Roman pots. Successive Popes have tried to immortalize their names by designing their Papal arms in neatly trimmed box (fig. 100).

There is a neat enclosed garden entered from the side of the Vatican Galleries, known as the Pine Garden, which is kept very secluded for the Pope's private use. It takes its name from a huge bronze fir-cone placed at one end of the garden, below a beautiful archway. The cone is believed originally to have formed the apex of the Mausoleum of Hadrian.

THE CHRYSANTHEMUM, WITH SPECIAL REFERENCE TO THE EARLY-FLOWERING VARIETIES AND THE NEGLECTED TYPES OF THE FLOWER.

By D. B. CRANE, F.R.H.S.

[Lecture delivered December 8, 1908].

WELL-KNOWN and reliable authorities on the cultivation of the Chrysanthemum have, in the past, so very ably and fully dealt with this subject, that little remains to be added to the advice so freely tendered by them. In the present instance, therefore, I propose more especially to call attention to the more neglected aspects of cultivation, and at the same time to endeavour to show how certain beautiful types of the flower—which some of us are disposed to regard as the 'Autumn Queen'—are very much neglected, or relegated to positions that are quite unworthy of their undoubted merits.

First, I desire to call your attention to a race of plants that have recently come into considerable prominence, in the hope that your sympathy and help may be forthcoming in promoting their cultivation in a variety of ways. I refer to the early-flowering Chrysanthemums.

It hardly seems credible that this type of the Chrysanthemum has developed in so short a time to the degree we see it to-day. In 1886 and a few years previous thereto, the list of cultivated varieties was a very meagre one, and the character of the plants therein represented of very doubtful quality. The habit of the plants at that period received little or no consideration; the chief concern of both raisers and growers was merely to possess themselves of something novel and pleasing both in the form and in the colour of the flowers.

Early-flowering varieties were not divided into sections as we have them now, both Japanese and Pompon types being included under one heading, 'early-flowering Chrysanthemums.' Of the Japanese varieties then in cultivation, not more than one is to be seen to-day, viz. Madame C. Desgranges, a popular white variety for many years, but now superseded by numerous excellent white varieties of both French and English origin.

Strange to relate, the pompons in the list published at the period already mentioned, are still very much grown. Nine or ten of the old varieties are catalogued to-day by most specialists, and several of them were exhibited at the recent October show.

Subsequent to this period, however, French raisers were busy, and not a season passed without a lengthy list of novelties emanating from one or other of them. In 1891 Mons. Simon Delaux—a genius in his day and generation—sent out no fewer than 125 new varieties, mostly of Japanese form, far too many for English growers to do full justice to. Of this wonderful series, many are in cultivation to-day, and are highly esteemed by enthusiasts who hesitate to cast off old friends that have served them so long and so well. In the early nineties, through the continued

enterprise and persistent efforts of the same raisers, new varieties were introduced in quick succession. The novelties were of varying worth, of course, in consequence of which only the better ones attained distinction and came to be freely grown. Such a result is inevitable.

With the introduction in 1894 of a Japanese variety named *Madame Marie Masse*, the whole character of the early-flowering *Chrysanthemums* changed. This variety was raised by Mons. Delaux and appeared to combine all those qualities that a good garden plant should possess. It had a good constitution, was of a very branching habit of growth, and was exceedingly free-flowering. Although officially described as lilac-mauve, the colour in the border was bright, and was a pleasing contrast to the many less bright tones of colour exhibited by the early varieties. Sportiveness appears to have been an inherent quality of this plant, for within a few years our gardens were made quite gay with the galaxy of colouring represented by varieties of similar habit which were mostly sports from the original. Cream, yellow, bronze, chestnut, cerise, pure white, primrose, peach, and crushed strawberry, besides other intermediate tones of colour are now represented by varieties that are sports either directly or indirectly from *Madame Marie Masse*.

From this one variety the present race of early-flowering *Chrysanthemums* has mostly sprung. Contrary to previous experiences, growers were able to procure pollen quite easily from it, and they were quick to take advantage of the opportunity of making crosses with other varieties, the progeny of which has exceeded all expectations. The original variety was used both as seed-bearer and as pollen-producer, and this accounts for so many of the resulting seedlings partaking of the excellent qualities for which the parent variety was for quite a long time famous. For years it was an easy matter to trace the well-defined characteristics of the parent plant in numerous varieties that were in general cultivation, but the lapse of time has largely obliterated these traits, so that it is now quite difficult to determine them. A matter for congratulation at this period was the work accomplished by English raisers. Previous to this period, however, Mr. Norman Davis, of Camberwell, and the late Mr. W. Piercy, of Forest Hill, had been working with the early varieties, and the latter had succeeded in raising a pompon, which he named 'Piercy's Seedling.' He was not very successful in this way, few of his seedlings achieving notoriety, but this variety has had a wonderful history, and is grown extensively to-day in both private and market gardens. He saw what few other men did, and that was the possibilities of the early-flowering varieties for market purposes and for border cultivation. He was most enthusiastic and succeeded in inducing many growers to take up their cultivation from a commercial point of view.

Later on, as English raisers overcame the difficulties of seed-saving, not a season passed without the introduction of many beautiful novelties. The result of their efforts quite eclipsed the work of Continental raisers, so that they ultimately had the field to themselves.

In more recent years M. Nonin has succeeded, in some degree, in reinstating French raisers. He has introduced quite an interesting series of beautiful varieties that compare very favourably with the best of our English seedlings. As a matter of fact, several of his novelties have

been certificated by the National Chrysanthemum Society, and they have even had Awards of Merit from the R.H.S. For these achievements we are very pleased, as it seems to suggest that English raisers will need to apply themselves more thoroughly to the improvement of existing varieties, which must in the end be for the public good.

The advent of the early single-flowered Chrysanthemums has done much to add zest to the work of raisers. Their arrival has pleased many, and they promise to alter the character of the displays in our gardens outdoors throughout September and October.

Within a period covered by three years, these single-flowered Chrysanthemums have been evolved. It is safe to predict that they will be quite as popular as the double-flowered. There are sanguine individuals who prophesy that the early single-flowered chrysanthemums will be even more popular than any of the other early-flowering types; and I am disposed to support this view. The plants are so easily cultivated and are so pleasingly varied in colour and form, as well as in their habit of growth, that there is nothing to hinder their progress in popular esteem.

At this point, however, it is necessary to halt. In the zeal that raisers have evinced there is a tendency to forget essentials. Admirers of these autumn flowers are ready to acknowledge what has been achieved in recent years and fully appreciate the progress raisers have made in improving the plant. We have arrived at a period, however, when more discrimination is necessary, otherwise we may have a surfeit of new varieties of which many may be of a mediocre character only and fail to reach the desired standard of quality. Not a season passes without an immense number of new ones being sent up for the recognition of the Floral Committee, and if the best interests of these early-flowering varieties are to be served, it is imperative that a wise discrimination be exhibited by those responsible for adjudication upon their merits. Already the awards that have been made in favour of some new ones have been questioned, although perhaps without justification. Nevertheless it must be admitted that the "hall mark" that an Award gives to a new flower should be a protection to those who purchase the novelty on the strength of this recognition.

There are certain essential factors which should always be embodied in a variety that receives this special recognition. For instance, the plant should be free-flowering and robust, sturdy and branching in its habit of growth, and in the colour of the blossoms distinct and pleasing. A point of considerable importance also is that the individual flowers making the spray should be carried on a useful length of foot stalk. It should be possible for each blossom to develop in good form without unduly crowding its neighbour, and the spray as a whole when at its best should carry each flower disposed in pleasing fashion. We want sprays of blossoms in which not a single flower is wasted. When the individual flowers forming the spray stand out distinctly one from the other, it is possible to use them either individually or as a whole in sprays, for decorative purposes. As a rule sprays of Chrysanthemums, which carry their blossoms in densely-flowered clusters, form a compact head of blossoms, the flower-stems of which are so short that it is impossible to break them out and use them individually. When such sprays are not

disbudded, they are seldom utilized by those who desire to make a pretty, artistic, floral arrangement, because they lack the grace and elegance that the more open type of growth invariably gives. The only satisfactory method of dealing with plants of this description, is to disbud to one or three buds on each shoot.

Keener discrimination appears to be necessary by those who determine the merits of new varieties, so that only the more useful plants are recognized. Their usefulness should be gauged on lines somewhat similar to those I have ventured to express.

We have a host of early-flowering varieties that fall short of the standard required (and now reached by some of the newer ones), that may well be dispensed with, notwithstanding the sentiment that attaches to many of them.

The cultivation of early-flowering Chrysanthemums has extended by leaps and bounds. For many years they have been popular garden plants, and as the flowers have improved, they have increased in popularity. Many of them will pass through the severest winter season without loss or inconvenience, and in less severe weather the majority of old stools will come through the ordeal unscathed. The ease with which the plants may be propagated should be a further inducement to take up their cultivation. Cuttings inserted in January, as the days appreciably begin to lengthen, invariably root quickly and easily, and their propagation by this means may be continued until May. Pretty plants result from a May insertion of the cuttings. Plants of the 'Madame Marie Masse' type produce numerous underground, sucker-like growths, that make the division of the plants a matter of comparative ease. It is astonishing what one old stool will divide up into. There are many newer varieties that may be dealt with in similar fashion, and if the division of the roots takes place in early March, the future success of the divided portions is assured.

Of the early-flowering varieties, the pompons in later years have been supplanted by their more fantastic rivals of Japanese origin. They have been neglected, not because they do not possess excellent characteristics, but probably because the individual flowers are not quite so attractive in appearance. As border plants they are ideal, and their growth in most instances is sturdy and branching. They develop a marvellous crop of dainty flowers, some much larger than others, and with additions made to the section in recent years, there are many very desirable plants now available. When planted in bold groups, or in beds by themselves, they are most effective, and as they keep in good condition for quite a long time, they have a claim upon our consideration when planting for autumnal effects. Only the better ones should be grown, however.

May I now direct your attention to the Anemone-flowered Chrysanthemums that come into flower in late October, and continue to provide a display of their quaint and curious blossoms throughout the whole of November and, in some instances, in early December?

Why these beautiful Chrysanthemums are not more freely grown quite passes my comprehension. Except for an occasional representation of highly-cultivated blooms at a few of our leading shows, these charming decorative blossoms are seldom met with. A few of the public parks do

them well, but how seldom are the Anemone-flowered types seen in the collections of private growers !

There are three distinct types of the Anemone-flowered Chrysanthemums, viz :—large-flowered, Japanese, and pompon. The first are very beautiful, having regularly arranged ray florets and a high, neatly formed centre or disc. The Japanese are of more fantastic form, the ray florets in many varieties being less regularly arranged ; in some blooms they are narrow and much twisted, in others broad and curled, and in some instances the ray florets droop and form an elegant fringe. As the name suggests, the pompon-anemones are miniature editions of their larger flowered rivals and as decorative material in a cut state, they are exceedingly pretty.

The rage for large blooms of other sections is no doubt responsible for the apathy on the part of growers towards the Anemone-flowered Chrysanthemums. Their cultivation is not by any means difficult : there are varieties that are less easy to grow than others, but taking the series as a whole, those who are disposed to grow them will find their cultivation not in the least difficult.

Chrysanthemum Societies throughout the country are largely responsible for the neglect of this and some other groups of Chrysanthemums. Those responsible for their government tell us that they are established 'to promote the cultivation of the Chrysanthemum' &c. &c., but apparently of the Japanese section only, if we may judge from the character of most of their displays. Incurved varieties are provided for too, but in a diminishing degree each successive year.

This unwise partiality for the Japanese varieties has ousted the beautiful Anemone-flowered types from shows and from private gardens as a consequence. There was a time, not a great many years since, when the plants of this type were associated quite freely with other types of this flower in groups arranged for effect, but they are rarely seen nowadays.

It is to their decorative value, however, that I especially desire to draw attention. Blooms of the highest quality may be obtained by disbudding the plants to three or four buds on each, but to see the Anemone-flowered varieties at their best the plants should be grown in bush-like fashion or else grown on to their terminal buds, and these thinned out to some extent. Each method has its advocates.

By pinching out the points of the shoots in early spring and repeating this treatment at intervals on each succeeding six inches of growth, beautiful bush-like plants may be developed. The last pinching of the growths should be done towards the end of June, after which the plants should be grown on to the terminal buds. When the buds are sufficiently developed, all except the largest and best shaped bud in the cluster should be removed, thus retaining one terminal bud on each shoot. Bushy plants formed in the manner I have suggested, should present a beautiful appearance at the flowering time and should be freely studded with dainty blossoms of good form, that are invaluable for indoor decoration. As plants for greenhouse or conservatory embellishment, they are very charming, pleasingly contrasting with other types of the flower. Plants of each of the three types may be treated in similar fashion,

although when disbudding the pompons I should be disposed to retain three buds on each shoot.

As the pompons are smaller blossoms than the large-flowered types they should be grown in freer fashion.

This freer method of growing the Anemone-flowered varieties was beautifully exemplified some years ago at Glasnevin Botanic Gardens, Dublin. It was my good fortune to be shown round by the popular Curator, Mr. Moore, who had conceived the idea of growing a large number of plants, each to carry some two dozen flowers. The Anemones were never better represented.

Almost all types of the Chrysanthemum were exhibited on this occasion, and the contrast in both colour and form, and the great wealth of blossoms represented in the fine display convinced me of the importance of regarding the cultivation of the Chrysanthemum from a broader and more comprehensive point of view.

The November-flowering pompons, too, are seldom provided for in the manner they justly deserve. Exhibitions here and there throughout the United Kingdom, occasionally have them represented, but mostly in severely disbudded form. The flowers in any form are interesting, and good cultivation such as is invariably seen in blooms of exhibition standard, causes their true character to be revealed. Freely grown pompons, however, are far more attractive as decorative plants than rigidly disbudded specimens, and flowers gathered from plants grown in this way, provide sprays of blossoms of a most charming description. The Chelmsford Chrysanthemum Society used to include in their show a class for six branches of undisbudded or freely-flowered pompon Chrysanthemums, and the display made by the exhibitors in this competition was convincing proof of their worth as decorative material.

A partial disbudding is better than the rigorous disbudding, practised by most growers of exhibition blooms. There are many of the older varieties that form dense cluster-sprays that must be partially disbudded if they are to be represented in really pleasing form. In so far as their habit is concerned, most of the plants are fairly dwarf and sturdy—tall plants are quite an exception.

Displays in the public parks not seldom include a few pompons, but these are mostly of certain popular varieties that have some distinguishing characteristic to justify their inclusion in the collection of Chrysanthemums. No attempt is made to grow a collection of say a dozen varieties, so that the general public have no opportunity of judging of the real merit of these flowers.

Plants of the pompon varieties should be treated as recommended for the Anemone-flowered group. Bushy plants should be formed by pinching the growths from time to time in this way making the foundation of capital specimen plants. A few varieties are rather late in coming into flower, but in most cases their cultivation is of the simplest.

The miniature-flowered pompons form another group that has not received the recognition it deserves. The two most popular varieties are Snowdrop (white) and Primrose League (yellow). These two varieties are grown more than the others, but even they are less extensively cultivated than they should be.

Partially disbudded sprays are beautiful in the extreme, and naturally grown plants produce charming sprays useful for many decorative purposes. The miniature-flowered pompons come into blossom rather later than the ordinary large-flowered mid-season varieties. The latter half of November may be considered their proper season of flowering, although it is quite an easy matter to have them in good form in early December.

The miniature-flowered pompons are seldom seen in public displays, except perhaps at the December shows of the National Chrysanthemum Society, where they are exhibited in vases and in a class for six bunches without any restriction as to varieties.

The same may be said of the spider-web-like and thread-petalled types of the flower. In this group there are several varieties that have little to commend them. There are, however, a fair number of most interesting ones, of which far too little is known. This section has been neglected by the vast majority of growers whose knowledge of the charms of these quaint flowers is very limited. It may be that an opportunity of seeing the flowers has never presented itself, and this may account for the apparent lack of appreciation of them. For December flowering the spidery varieties are extremely useful, more especially in decorations where they may be disposed in sprays with long stems. 'Mrs. Wm. Filkins,' 'King of Plumes,' and 'Mrs. James Carter' are three interesting varieties, of quite distinct form. Market growers are now cultivating a few of the better and stronger-growing ones, and this may have the effect of creating more interest in the section.

Neglect of the single-flowered types can no longer be laid to the charge of growers. In most gardens these free-flowering decorative Chrysanthemums are now represented. They are divided into two sections, viz. small-flowered, and large-flowered. The small-flowered type includes varieties having flowers two inches or less in diameter, and the large-flowered section includes all single Chrysanthemums exceeding a diameter of two inches. By far the larger proportion of singles belong to the latter section, and are of varying form, colour and size.

A true single should not contain more than a double row of ray florets and these should form a dense fringe round a not over-large disc or centre. Many popular varieties of to-day possess considerably more than two rows of florets. In recent years encouragement has been given to varieties that flower in profusion, in which the number of rows of florets is not regarded in quite the same light as formerly. The decorative value of the variety is of primary importance, and in this connection colour, of course, plays an important part. The rigid lines laid down by the older florists do not receive the respect formerly accorded to them; instead, a more practical view is taken of the newer varieties when they are submitted for adjudication, and their decorative qualities are considered of paramount importance. Some of the awards of recent years have been quite inexplicable to the older florists, many of whom fail to see the slightest claim to distinction in the newer varieties. But when regarded as plants for greenhouse and conservatory decoration, where their profuse flowering is of primary importance, the justice of the decisions in their favour is unquestionable.

The remarks applied to the early-flowering out-door singles apply with even greater force to the later ones. The latter should provide a display of blossoms from late October until December is well advanced, and throughout this somewhat lengthy period the demand for the single-flowered varieties is increasing in a remarkable degree.

Densely-flowered cluster-sprays are distinctly top-heavy, and are therefore less sought after than those having their flowers on long foot-stalks.



FIG. 101.- CHRYSANTHEMUM 'CALEDONIA.'

(Award of Merit, November 24, 1908. See p. ccxliii.)

A very large proportion of the varieties catalogued by the specialists to-day are too weak in the flower-stalks. Instead of the flowers being held in an upright position, they droop their heads, and the flower stalks lack the stout and erect character that is essential.

In judging of the merit of the single-flowered Chrysanthemums, the number of rows of ray florets should not preclude any variety from the possibility of gaining a certificate of quality, provided there are not too

many rows to justify the flowers being regarded as semi-double. Colour and general decorative utility appear to be points of primary importance, and if they, together with a good bushy habit, be represented in the plant, surely these points are sufficient in themselves to justify special recognition.

In recent years there has been a disposition to describe the single flowers having several rows of florets, as decorative-singles, but what of the others? Are they not decorative, and if so, should they not be classed in the same way? Exhibiting has its advantages, but if in encouraging the exhibition types we are eliminating the better decorative elements of the flowers, the sooner a different standard of quality is set the better. After all, it is their practical value that must have first consideration.

The form of the single-flowered *Chrysanthemums* has changed very considerably in recent years. We are now acquiring a number of varieties that are more fantastic and pleasing than the even, regular flowers that were regarded as ideal in earlier days. The suggestion has been made that blooms with twisted, curled, drooping and otherwise curious-shaped florets should be placed in a new section under the descriptive title of 'Japanese Singles.'

This suggestion might well be carried into effect to the advantage of all concerned. Many admirers of the fantastic singles have a decided preference for flowers of this form over the more even and regular blooms that first found favour. A number of new varieties of this class are added every year, and as their decorative qualities become better known there is reason to believe they will oust the earlier race of flowers from their proud position, as the Japanese have done the incurved blooms in the double-flowered sections.

The so-called Japanese singles can already be obtained in infinite variety of form, and the stellate character of many of the flowers ensures their effective use in artistic floral decorations.

Recently we have seen varieties in which the inflorescence is carried a long way down the spray, and distinctly pretty they are. The older florist, however, has already shown his disapproval of their recognition, and in no uncertain terms has said, they are only fit for the rubbish heap. Novelty in this respect should be encouraged and blind prejudice should be ignored.

The most satisfactory fact regarding the single-flowered *Chrysanthemums* is that market growers are beginning to appreciate their value. These growers, however, are very hard to please. An essential factor in their opinion is that the flowers should travel well.

Varieties having stiff stout florets appear to find more favour with market men as they are less likely to get damaged in transit from their gardens to the various markets. It may be that they will in time conceive a new or better way of packing the single-flowered ones and then they may be more disposed to grow other varieties than the limited selection their present rule imposes on them.

The market growers also say that the eye or centre of the flower is too large in most instances. They are so emphatic in this assertion that they unblushingly state "all you see in some flowers is the eye." This

may be a failing with some varieties, but we fail to see any real disadvantage, as the yellow or greenish-yellow colouring of the eye invariably contrasts pleasingly with the ray florets when they are well disposed round the same. This seems to point to the need for possessing ourselves of singles with good and distinct colours, in which case they would far outshine the eye in their attractiveness.

The claims of varieties suitable for market growers are now receiving attention. Hitherto Japanese blooms of medium size have received little notice from leading societies. Many very beautiful varieties have been ignored because they failed to attain to the high standard of quality set up by exhibitors of the Japanese Chrysanthemums. Within the last two years the whole state of affairs has altered, and many charming varieties have been recognized by an Award because they have a special value for decorative purposes and for market growers.

It is astonishing what an impetus this recognition has given to the cultivation of medium-sized flowers. Market men are quick to appreciate the recognition of their claims.

Essential characteristics of all blooms intended for market purposes are that should they be produced on stout, erect flower stalks, which should be clothed with foliage, and, most important of all, the petals should be of sufficient substance to travel without bruising unduly.

Good and distinct colours of pleasing tones have a greater interest for market growers than those of dowdy or less interesting shades of colour, and now that a standard of quality has been set up we may look forward to the future with confidence. Our greenhouses and conservatories are destined to present a more gay appearance in the dull season of the year than would have been the case were the smaller flowers ignored.

In the hope that these praiseworthy efforts will still be persisted in, we may safely leave the matter in the hands of the Chrysanthemum specialists to maintain the well-being of the flower.

HIGH NITRIFICATION OF SEWAGE EFFLUENTS.

WITH SIMPLE METHODS OF OBTAINING THEM FOR HORTICULTURE.

By W. D. SCOTT-MONCRIEFF, F.R.H.S.

[Lecture delivered January 26, 1909.]

Our knowledge regarding the natural processes that reduce organic matter to its original inorganic elements is of recent date. There is a distinction between the contributions of those who have made more or less speculative suggestions and the pioneers who have not only taken up a theory but have succeeded by actual experiments to positive proof. Although Cagniard de la Tour and Schwamm in the beginning of the last century demonstrated that yeast was a living plant, and that putrefaction was due to something in the air that could be destroyed by heat, the catalytic theory, so fiercely advocated by Liebig and his followers, delayed the acceptance of the germ theory for more than thirty years, and it is to the illuminating genius of Pasteur that we are indebted for having proved the connection of microscopic life and all forms of putrefaction without an exception of any kind. The suggestions made by Dupré in 1886 that sewage discharged into a river might be purified by the cultivation of low organisms on a large scale may very well have emanated from the labours of the great Frenchman, but the vagueness of the proposal shows how little was really known of these vast natural processes even twenty years ago.

The first application in this country of the knowledge of bacteriologists that certain organisms had the power of liquefying organic matters was made by myself in 1891 in what are known as the Ashted experiments, in which there was a tank, of a peculiar construction, filled with large flints that provided surfaces for the propagation of the organisms contained in the sewage from a household of about ten persons.

The process referred to was a purely putrefactive one, and the results obtained were due to the work of anaërobic organisms and their ferments, which break down the organic matter into simpler molecular forms, and so prepare the polluted liquid for the further purification carried on by different kinds of organisms working under highly aerobic conditions. My efforts to solve the second half of the problem, involving the oxidation of the substances that may be spoken of as being on the way to final mineralization, were not rewarded with much success, and it was not until 1897 that I devised a very simple apparatus that produced results far in excess of any other process. The arrangement is shown on the accompanying diagram (fig. 102), and consists of a series of superimposed trays, each containing suitable filtering material, so that the liquid could drip from one to the other, with an ample provision of air in the spaces between the trays.

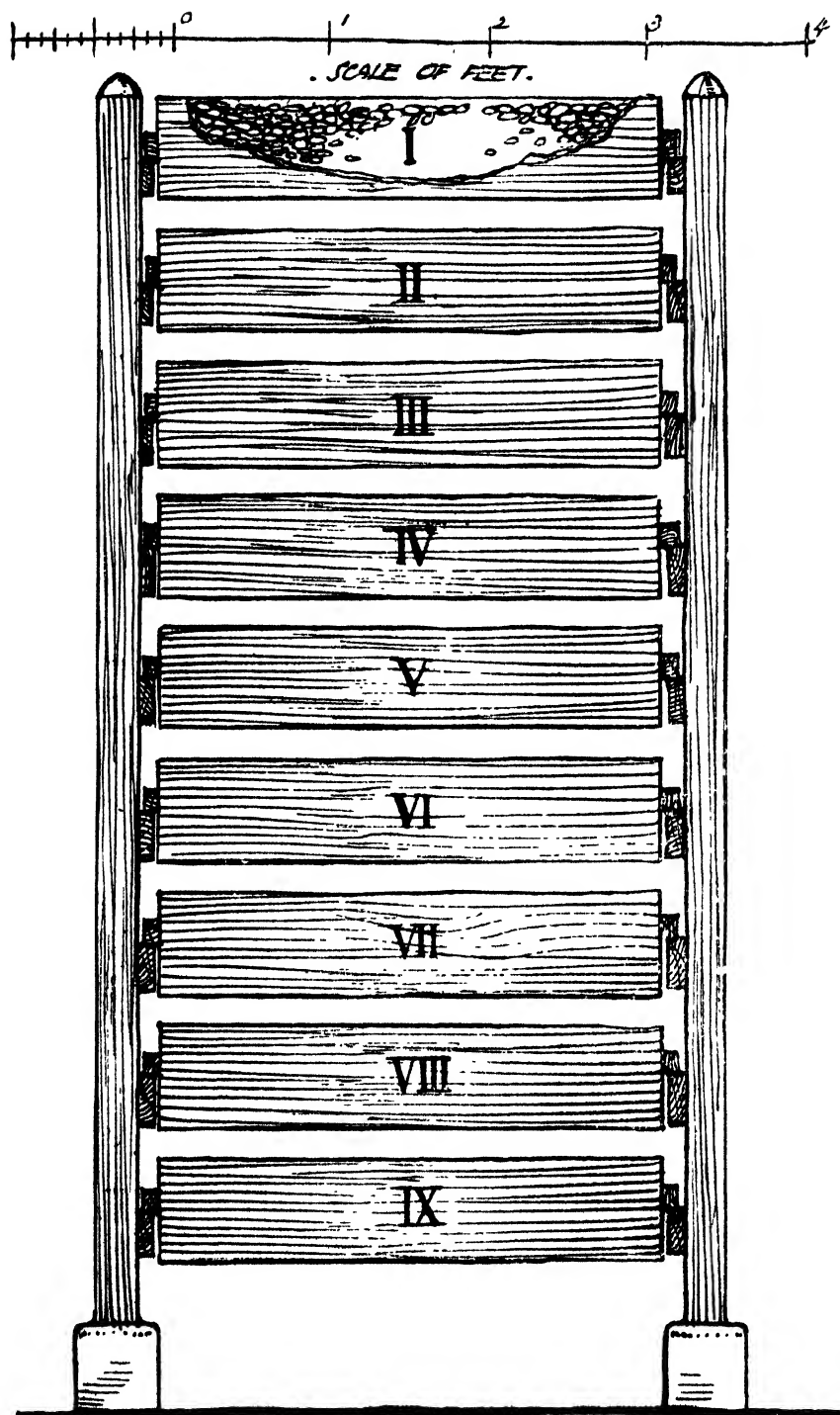


FIG. 102.—DIAGRAM SHOWING ARRANGEMENT OF FILTERING TRAYS.

The disadvantage of this form of filtration is that the cost of construction on a large scale is practically prohibitive, and it only quite recently occurred to me that, although this is true, nevertheless an apparatus of quite moderate dimensions is sufficient for the purposes of horticulture, and is capable of supplying an almost perfect plant food—say, up to 150 gallons each twenty-four hours at an altogether nominal working expenditure.

It is on the strength of these facts that I ventured to offer a paper for the acceptance of this Society, and I shall now give a more detailed description of the apparatus and say something of the chemical transformations which it is capable of producing.

It will be well to say something in the first place about the general principles that are involved in a solution of the problem of converting the organic substances of sewage into their mineral equivalents by the aid of the bacterial action of a percolating filter. It is now many years since I laid down the proposition that, excluding temperature, which in practice is a question of climate, there are four, and only four, factors to be dealt with. These are (1) the rate of flow, or, in other words, the quantity per unit of time that should be discharged on the filter; (2) the depth of filter required to give any desired standard of purification; (3) the period of rest between each discharge; and (4) the amount of air necessary to enable the nitrifying organisms to carry out their work to the greatest advantage. So far as I know this statement has never been contradicted, and my contention is that in every case there should be an exact estimation of these factors in order to know how the best results can be obtained. Of course in comparing the results of identical conditions upon different liquids, the filtering materials must also be identical.

Dealing with the first of the four factors, in order to discover the best rate of flow, it is necessary to make estimations by error; but in practice it has been found that, in dealing with ordinary domestic sewage, with a well-constructed filter, the rate of flow may be taken at an average of about 1,000,000 gallons to each acre in every twenty-four hours, or at the rate of one gallon to each foot each hour. It has also been shown by the installation of these bacterial trays at Caterham that the rate of flow for any given standard of purification must be inversely as the amount of organic nitrogen contained in the sewage itself—that is to say, for a sewage of double the strength the rate of flow would have to be reduced by 50 per cent., of three times the strength by 66 per cent., and so on proportionately in every case.

With regard to the second factor—that of filtering depth required for any given surface area and rate of flow—it is obvious that in the case of the trays this speaks for itself, because, if the filter is made deep enough to begin with in the testing experiment, it is only necessary to select the tray that gives the required standard of nitrification. To obtain the highest possible the flow must be reduced until the highest is produced.

The third factor—that of the best period of rest between each discharge—is a very important one. When it is realized that time is a necessary element of the process it is obvious that, if the organic matter is delivered to the organisms more quickly than they can deal with it, or under unfavourable conditions, then there must be an

accumulation in the filter itself, and this soon gives rise to trouble, not only by choking it up, but on account of the undigested substances having a tendency to lower its efficiency.

On a large scale this element of rest in the form of an intermittent discharge can be arranged by altering the rate at which the distributing apparatus passes over any particular spot, but for the purposes of experiment and producing an oxidized effluent upon a scale suitable for use in a garden or under glass, I have devised an apparatus which consists of a tilting apparatus discharging the sewage to be dealt with on an even surface over a perforated tray, and the period between each discharge is regulated by means of weights which are so placed as to control the tilting of the tipper to any periods required. In order to avoid the difficulty of dealing with a very small orifice I have also devised a gauging box, in which the liquid is discharged over a sloping surface, and then into a trough, in such a way that any required quantity may run to waste, and a measured balance be thrown into the apparatus for distribution.

Turning your attention to the drawing (fig. 102), it should be observed that as each of the filtering trays gives a definite result in the form of chemical changes, it follows that the food supply of the organisms must be correspondingly altered, and that there is therefore every reason to believe that the organisms are changed both in character and kind in correspondence with the altered environment which occurs in each successive tray.

This action, taken as a whole, is known as symbiotic, in which the work of one organism is, as it were, handed over to another to complete. In theory there should be distinct survivals, each produced by natural selection, so that first the organic nitrogen is reduced to nitrogen as ammonia, secondly to nitrogen as nitrites, and last of all to nitrates in combination with a base such as lime or soda, which is the final change from the organic to the original inorganic form.

The table on the next page shows what actually occurred in the Ashtead experiments. Each line gives the work that has been carried out in each tray; and, although it is difficult to identify all the organisms that produce the various changes, it is quite certain that the conditions throughout are inimical to the life of the anaërobic and putrefactive organisms that come over from the cultivation tank, and it has been shown that at any rate there is a great diminution in the numbers of the *Bacillus coli communis*, which is a characteristic organism in crude and septic sewage.

When the vast numbers and the varieties of the organisms engaged in the work of purification are realized, and the fact that they carry out the most complicated chemical changes, it will be readily understood that the scientific aspects of the problem are quite inexhaustible. From a practical point of view, on the other hand, nothing could be of more primitive simplicity, and all that the gardener is called upon to deal with is a few ordinary wooden boxes placed one above the other with perforated bottoms and filled with coke. In cases where a sufficient fall is available the sewage may be simply strained and discharged into a tank fixed at a level that will allow of its contents passing on to the distributor, or it may be pumped up by hand into a tank at convenient

TABLE SHOWING SUCCESSIVE STAGES OF MINERALIZATION BY NITRIFYING ORGANISMS.
ASHTHEAD EXPERIMENTS, FEBRUARY 1898.

Description of Samples.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Chlorine.	Free NH_3 .	=N.	Albuminoid NH_3 .	=N.	Oxygen consumed.	Oxygen consumed by iron and nitrogen.	Nitrogenous gen.	=Oxygen required.	Nitrogenous gen.	=Useful Oxygen to N_2O .	Total Oxidized Nitrogenous gen.	Available Oxygen from H_2O and N_2O .	Total Unoxidized Nitrogenous gen. (Kjeldahl).	Total Organic Nitrogenous gen.	Total Inorganic Nitrogenous gen.	Total Nitrogenous gen. of all kinds.
Effluent from Cultivation Tank, taken 3 and 5 P.M.	9.0	12.5	10.30	1.50	1.23	9.843	9.843	Nil	—	0.12	0.274	0.12	—	9.57	2.05	10.42	12.47
1. Effluent from First Tray.	9.0	10.5	8.65	1.25	1.03	6.694	5.56	0.99	1.13	0.096	0.219	1.036	—	6.47	11.5	2.85	9.74
2. Effluent from Second Tray.	8.5	9.0	7.42	1.00	0.82	5.773	4.74	0.90	1.03	0.48	1.09	1.38	—	4.66	11.10	3.68	8.80
3. Effluent from Third Tray.	8.5	5.0	4.12	0.60	0.49	4.493	3.60	0.78	0.59	1.87	4.27	2.65	—	0.22	6.60	2.48	6.77
4. Effluent from Fourth Tray.	8.0	4.0	3.3	0.35	0.29	1.728	0.98	0.66	0.75	2.76	6.30	3.42	+	4.58	5.15	1.85	6.72
5. Effluent from Fifth Tray.	7.75	1.5	1.24	0.15	0.12	1.28	0.73	0.48	0.55	4.68	10.70	5.16	+	9.42	1.75	0.51	6.40
6. Effluent from Sixth Tray.	8.0	1.75	1.44	0.35	0.29	1.497	0.92	0.51	0.58	4.416	10.10	4.926	+	8.61	2.25	0.81	6.37
7. Effluent from Seventh Tray.	7.5	0.35	0.29	0.30	0.25	0.755	0.755	Nil	—	6.6	15.08	6.6	+	14.33	0.85	0.56	6.89
8. Effluent from Eighth Tray.	7.5	0.20	0.165	0.65	0.53	0.397	0.397	Nil	—	7.32	16.73	7.32	+	16.34	1.03	0.865	7.48
9. Effluent from Ninth Tray.	7.5	0.25	0.206	0.60	0.49	0.589	0.589	Slight trace	—	9.0	29.0	9.0	+	20.1	0.60	0.394	9.21

Colones of Aerobic Nitrifying Organisms.

Colonies of Aerobic Nitrifying Organisms.

intervals, say once in twenty-four hours, and in that case may be taken from a cesspool. The amount of attention required is practically *nil*, but a few minutes should be devoted to it every morning to see that the apparatus is working properly.

Dealing now with the economic aspect of the apparatus, the results obtained in continuous working over a period of many years are so high as to place its value beyond all question. Sir Wm. Crookes, in his presidential address to the British Association at Bristol in 1898, estimated the loss arising from the wasted sewage of this country alone at £16,000,000 per annum—a sum that would pay three per cent. on a capital expenditure of £820,000,000 and still provide £6,400,000 per annum for wages and depreciation. Seeing that ninety per cent. nitrification of the total nitrogen in the effluents from ordinary sewage can be obtained by the Ashtead apparatus, it follows that if the same conditions could be applied to all the sewage of this country there would be a saving of £14,000,000 out of the £16,000,000 referred to, with a margin for gaseous losses as well. In these estimates it must be observed that the nitrogen is not in a state that can be dealt with as an article of commerce, seeing that it is diluted with enormous quantities of water, which could only be conveyed in pipes to the points required. It is therefore necessary to deal with the liquid form as we find it.

The following is the standard solution adopted by Nobbe as a model plant food supplied in parts per 100,000 :

Lime	16.0	Chlorine	21.0
Magnesia	8.0	Oxide of iron	0.5
Potash	31.0	Nitrogen	8.2
Phosphoric acid	7.0		

There is no doubt that all these substances are to be found in the effluents from ordinary sewage; but the most important of them, from a manurial point of view, is the nitrogen. Upon comparing the results from the Ashtead apparatus with these figures it will be seen that the nitrogen obtained in an available form from the average of the eighth and ninth trays, or 4 feet 3 inches of filtering depth, is 8.16 per 100,000, which is almost identical with the figure given by Nobbe.

Dr. Voelcker, in a letter to the late Mr. Pidgeon, speaks of this solution as “containing those constituents, and the amount of each, which have been found to be requisite for plant growth, and the absence of any of which or the supply in markedly lesser quantity of which would produce deterioration, while the larger supply of any of which would not be attended by increased benefit.”

Turning now to the productiveness of small areas under highly artificial conditions—a paper by Mr. Bear appeared in the *Journal of the Royal Agricultural Society* for 1889 in which he gives the return of grapes at an average of 12 tons from the acre, or 14 tons from grapes in full bearing, and tomatoes at an average of 20 tons from the acre, both crops to a great extent being grown on the same acreage. I have no figures to show the cost of fertilizers required in order to produce these marvellous results, which if generally realized would postpone the pressure of population upon food supplies among civilized communities for an indefinite time ;

but if, instead of carrying on their business in places selected for other reasons, the owners of glasshouses were to settle near sewage outfalls, where such effluents were available, they would get their fertilization for nothing, presuming that the communities producing the sewage regarded it as of as little value as they do at present.

Coming to the practice of nitrification on a small scale, sufficient for the production of about 150 gallons of highly fertilizing effluent each twenty-four hours, the surface area of the filtering trays would require to be six square feet. It will be noticed that they are shown 8 feet in length, in which case the width would be 2 feet. Any hard material, graded properly, serves as a filtering medium; but, seeing that the Ashted results were obtained from hard coke from the gasworks graded to particles of 1 inch to $\frac{1}{2}$ inch—and this is generally available—it would be as well to use it in preference to anything else.

The filtering boxes or trays are supported upon an upright framework, which must be strengthened by struts or stays unless the posts can be fixed above to the ceiling or rafters of a shed. It will be noticed that provision is made for sliding them out and in like drawers. When once the distributing apparatus is started it works continuously night and day with practically no attention, and the only requisite is a little patience to allow of the filter's "maturing" or becoming ripe, which they begin to do very rapidly, so that a high nitrification should begin to be obtainable in about three weeks from the date of starting. When once established, the nitrification goes on automatically and without cessation.

Before concluding, it may be well to anticipate any criticism based upon the value of the nitrogen obtained, say in 24 hours from the apparatus, in terms of the market price of nitrates, and to point out that the effluents spoken of are very different from the same quantity of water containing one or two pennyworths of nitrate of soda. The estimate of value must be taken from the manurial qualities of the natural plant-food as a whole. At Caterham, upon a hungry chalk soil, the growth of dahlias was phenomenal after watering with the effluent from the barrack sewage. The plants were about six feet in height, sixteen feet in circumference, and covered with blooms. I do not know of any other manure that would have given similar results.

When Warrington in 1850 read his paper before the Chemical Society on "The Adjustment of the Relations between the Animal and Vegetable Kingdoms, by which the vital functions of both are permanently maintained," he struck the highest note possible in connection with the final solution of the sewage problem; and it is because this very simple apparatus does to a great extent realize this conception in practice at very small cost that I have ventured to bring it before the notice of this Society.

GOOSEBERRY-MILDEW AND GOOSEBERRY CULTIVATION.

THE PRESENT ASPECT OF THE QUESTION.

By Professor JAKOB ERIKSSON, Ph.D., Hon. F.R.H.S.,
of the Experimentalfältet, Stockholm as on p. 472.

1. *The Native Country of the Fungus.*—The American gooseberry-mildew (*Sphaerotheca mors-uvæ*, Berk.) is a native of North America where it has been known at least seventy years. It has ruined partially or entirely the cultivation of gooseberries in North America, especially of the European varieties, which are improved descendants of the species *Ribes Grossularia*.

2. *The Immigration and the Spread of the Disease in Europe.*—The disease has spread in Europe from two centres, one in the east and one in the west.

From the eastern centre the spread seems to have commenced about the year 1890, or a year or two earlier. The disease was then introduced into a garden in Winnitz, in Podolia (South-West Russia), by means of directly imported American gooseberry-bushes. In 1890 it appeared in the town of Winnitz and its neighbourhood. Thence it spread to the Government of Moskva and to the Baltic Provinces. In the year 1904 the disease had become established in European Russia in ten widely separated localities, and subsequently it has spread from Russia to the neighbouring European countries.

From the western centre the disease began to spread about ten years later, viz. in 1900, when it was introduced simultaneously into Ireland and into Denmark. Since then it has spread from these places to other States of North-Western and North Europe.

At the present moment we may mention as the most affected countries of Europe—Russia, Finland, North-East Germany, Ireland, Denmark, Sweden, and Norway.

3. *The Intensity of the Disease.*—Since its introduction into Europe the disease has increased in virulence, and there are no signs at all that indicate any weakening of the fungus.

4. *The Susceptibility of Different Varieties of Gooseberry.*—No difference of susceptibility between different varieties of gooseberry has yet been noticed sufficient to afford ground for believing that the disease can be fought by means of resistant varieties.

5. *The Disease Attacking other Species of Plants.*—The fungus has also been observed in some localities on *Ribes nigrum*, *R. rubrum*, *R. aureum*, &c., but, so far as I know, in no place very abundantly. In one place of South Sweden the fungus appeared on *Rubus Idæus* in two consecutive years.

6. *The Outbreak of the Disease.*—In many cases we can distinguish between the spring, summer, and autumn outbreaks.

The *spring outbreak*—occurring at Stockholm from the middle to the

end of June—on the young fruits, sometimes on the young shoots as well, is to be referred to external infection, either (1) from hibernated perithecia on the same or neighbouring bushes, or (2) from berries or shoots already covered with the white powder consisting of the spores.

The *summer outbreak*—at Stockholm from the middle to the end of July—(1) on young newly planted bushes is not caused only by external infection with the white powder from diseased bushes growing in another place; in many cases I believe that an invisible germ of disease already exists within the young bushes themselves at the planting time. Nor is the summer outbreak (2) on older bushes, previously seriously attacked and heavily pruned, to be explained in all cases only by means of external infection from other diseased bushes; here, too, we must suppose an invisible germ of disease incorporated within the bush during the previous year of disease.

The *autumn outbreak*, August–October, is principally to be referred to external infection caused by other diseased bushes.

7. *The Spread of the Disease during the period of Vegetation* takes place principally through the carrying of the spores on solid objects, living or dead, and also, through shorter distances, by means of the wind. The spread is often capricious, being sometimes of greater, sometimes of less, extent than we have had reason to expect.

8. *The Spraying with Fungicides generally Insufficient.*—This treatment helps only for the moment. The success of the spraying depends not only on the power of the fungicide to kill the spores or the threads of the fungus, but also on the manner of growth of the plant sprinkled. Now the continuous putting out of new shoots and the folded foliage of its tops, make the gooseberry bush difficult of access for the purpose of spraying. Spraying is therefore needless trouble and useless expense.

9. *The Pruning of Diseased Young Shoots.*—Such a pruning during the summer can be effective only in rare cases where the bush is but slightly affected; that is to say, if the diseased shoot is immediately observed and removed, and if, neither before nor during the process, nor after the removal of the diseased part, the contagion is carried to other shoots of the same bush. It being impossible, however, to estimate these chances beforehand, we can by no means rely on the shoot-pruning process during the summer as being a sure means of combating the disease, or on its being a method advisable in practice. Such a pruning may become the best ally of the enemy.

The pruning of diseased shoots late in the autumn, October–November, is capable of diminishing the strength of the next spring outbreak on the same bush and its nearest neighbours; but, as a rule, it does not prevent the outbreak of the disease in the following summer, and besides, it cannot be carried out with thoroughness, as far as the pruning of seriously diseased older bushes is concerned. The autumn pruning, therefore, would be a dangerous weapon in the enemy's hand.

10. *The Cutting Down of Diseased Bushes late in the Autumn.*—Even when diseased bushes have been cut down to the ground, all cuttings burnt, and the ground sprayed and limed—two years consecutively—this proceeding has, so far as I know, in no case been able to eradicate the

fungus. In the following summer—at Stockholm from the middle to the end of July—the disease has again appeared on the new shoots, which up to that time had been apparently healthy, and within a short time—one or two weeks at most—it has been found seriously attacking the whole plantation.

A telling instance is given by a grower in South Sweden. In a letter of June 28, 1908, he writes as follows: "In 1905 I ordered from a nursery at Stockholm a hundred gooseberry bushes of different varieties for the purpose of planting in a garden where gooseberry bushes had never been cultivated before. The next summer I had the mildew on every plant. Then I cut all the bushes to the ground, and sprayed the tops of the shoots as well as the ground with a solution of potassium sulphide and lime-wash; I repeated this treatment in the autumn of the same year, as well as in the spring and autumn of 1907. It is true that some plants died, but the bushes that were left appeared, relatively, vigorous. These were sprayed thoroughly last spring, 1908, with a strong solution of bluestone (copper sulphate), lime, and imperial green. In spite of these energetic measures every bush shows at this moment, and has shown for the last two weeks, the disease in its most marked form. And what is especially sad is that I have, in the immediate neighbourhood, another garden with a large number of older gooseberry bushes, and here, too, the disease has now appeared, thus endangering the cultivation of the gooseberry in the whole district, where the mildew has hitherto been unknown."

It may be added that the above-mentioned plants came from a nursery which I had examined in the autumn of 1905, without being able to discover a single trace of the disease.

11. *Is the Disease Internal in the Gooseberry-plant?* It is a common idea that this mildew, like all other kinds of mildew, is confined to the surface only of the plant attacked, and that it lives so superficially on it that the mycelium does not penetrate into the interior of the tissue, but only sends minute suckers (*haustoria*) into the epidermis-cells, which are poor in nutritious substances. This theory, however, scarcely explains how the fungus is capable not only of rapidly and thoroughly covering the surface of the attacked organ with a cobweb overgrowth, but also of causing great damage to the organ itself, and even of destroying it completely.

This theory is insufficient to explain the numerous experiences gained during the last few years concerning the gooseberry-mildew. I cannot, therefore, but suppose that the fungus is able to live—perhaps in a form very difficult of recognition—within the diseased shoot itself, and to thoroughly infect the interior of it. At the end of the period of vegetation, late in the autumn, a sap thus poisoned is diffused down through the stock and the root. In the following season this sap-stream rises again in the plant, and causes in a few days a new outbreak of the disease.

That such an internal symbiosis through the whole plant really exists in corn-plants, seriously attacked by different kinds of rust, is a matter that nowadays can hardly be disputed, even though some links in the chain of evidence are still wanting.

Microscopical examinations of young shoots of gooseberries, healthy as well as diseased, support the hypothesis, though to thoroughly prove the truth of it may take many years of investigation.

12. *The Inspection of Nurseries.*—The experiences gained in Sweden during the years 1905 and 1906 prove plainly the worthlessness of such inspections. In September 1905 I and my assistant, Dr. T. Wulff, examined all the beds of gooseberries at Experimentalfältet (Royal Agricultural Academy, Stockholm), and Dr. T. Hedlund (Agricultural College, Alnarp) inspected those at Ramlösa, near Helsingborg. Both the nurseries were declared free from disease. In spite of this, the fungus was found in the summer, 1906, universally and seriously attacking not only both these nurseries, but many other gardens in different parts of Sweden: gardens that had received plants from the nurseries in 1905 or, in some cases even, in 1904.

Thus it is impossible to ascertain with certainty, by means of inspection, whether a plantation is really healthy or not. The only thing that can be said after such an examination is whether the disease has been detected in the plantation or not.

13. *The Rooting-up and Burning of Diseased Bushes.*—The safest step is to uproot and burn the bushes attacked, but this must be done before it is too late. This is the only way of saving the gardens still free from disease. No new bushes must be planted in infected localities.

In localities where the disease already exists to a serious extent and where it is already too late to adopt this precaution, private growers must choose between (1) rooting-up and burning the diseased bushes, and (2) pruning, spraying, and liming them late in the autumn.

14. *Can the Gooseberry-Culture of Europe still be saved?*—There is hope of its being saved only if the authorities and growers unite in fighting the enemy, and continue the combat with energy and persistence for two or three years. The highest agricultural authorities of every country ought to issue prohibitions against the importation of gooseberry-plants, or parts of them, and against the transportation of them from garden to garden, and ought also to order the private growers to immediately destroy every diseased bush without delay. The authorities of every country ought to beg the growers to strictly observe these decrees, and should appoint officials under whose control the fight may be carried out. Private growers must learn to understand that energetic and speedy action will be the only way of saving the plantations which are still free from disease; and fortunately we can say that, in most European countries where gooseberries are cultivated, the greater part of the gardens are still healthy.

[NOTE.—It may be well to point out, for the benefit of those fruit growers whose opportunities do not allow them to keep pace with current mycological research, since an important recommendation rests chiefly upon it, that Prof. Eriksson's theory of the presence of an invisible, or practically invisible, germ of disease in the cells of the infected plant has not found acceptance among mycologists in this country, and only to a very small extent among foreign botanists. The majority regard it as an unnecessary hypothesis, and many as being altogether disproved even in the case of the rust of corn.—EDITOR.]

THE PUBLIC GARDEN IN FUNCHAL, MADEIRA.

By ALARICUS DELMARD, F.R.H.S.

THIS garden, situated in the centre of the town, though not large, is interesting on account of the variety of plants collected in so small an area and the perfection of each individual specimen.

The following is a list of the principal plants represented :—

- | | |
|--|---|
| <i>Acacia Farnesiana.</i> | <i>G. robusta.</i> |
| <i>A. melanoxylon.</i> | <i>Hibiscus Rosa-sinensis</i> (many varieties). |
| <i>A. neriifolia</i> (= <i>A. retinodes</i>). | <i>H. schizopetalus.</i> |
| <i>Agathis loranthifolia</i> | <i>Jacaranda ovalifolia</i> |
| (= <i>A. Dammara</i>). | (= <i>J. mimosaeifolia</i>). |
| <i>Ailanthus glandulosa.</i> | <i>Juglans nigra.</i> |
| <i>Apollonias canariensis.</i> | <i>Juniperus chinensis.</i> |
| <i>Araucaria brasiliiana.</i> | <i>J. virginiana glauca.</i> |
| <i>A. Cunninghamii.</i> | <i>Lagerstroemia indica.</i> |
| <i>Bocconia frutescens.</i> | <i>Latania Commersonii</i> |
| <i>Brunfelsia Hopeana</i> | (= <i>L. borbonica</i>). |
| (= <i>Franciscea uniflora</i>). | |
| <i>Cassia ferruginea.</i> | <i>Laurus Camphora.</i> |
| <i>C. marylandica.</i> | <i>L. Cinnamomum.</i> |
| <i>Celtis australis.</i> | <i>Libonia floribunda.</i> |
| <i>C. occidentalis.</i> | <i>Magnolia glauca.</i> |
| <i>Cephalotaxus drupacea</i> | <i>M. obovata.</i> |
| (= <i>C. Fortuni</i>). | <i>Melaleuca fulgens.</i> |
| <i>Cercis Siliquastrum.</i> | <i>Melia Azedarach.</i> |
| <i>Chamaerops humilis.</i> | <i>Monstera deliciosa.</i> |
| <i>Chorisia crispiflora.</i> | <i>Negundo aceroides.</i> |
| <i>Clerodendron squamatum.</i> | <i>Ocotea foetens.</i> |
| <i>Cordyline indivisa.</i> | <i>Pandanus utilis.</i> |
| <i>C. terminalis.</i> | <i>Phoenix canariensis.</i> |
| <i>Cryptomeria japonica.</i> | <i>P. dactylifera.</i> |
| <i>Cycas circinnalis.</i> | <i>P. reclinata.</i> |
| <i>C. revoluta.</i> | <i>P. sylvestris.</i> |
| <i>Dichorisandra thyrsiflora.</i> | <i>Plumbago capensis.</i> |
| <i>Dicksonia antarctica.</i> | <i>P. zeylanica.</i> |
| <i>Dombeya Wallichii.</i> | <i>Poinciana regia.</i> |
| <i>Dracaena Draco.</i> | <i>Pritchardia filifera.</i> |
| <i>Eucalyptus ficifolia.</i> | <i>Ptychosperma elegans.</i> |
| <i>Flugenia cotinifolia.</i> | <i>Punica Granatum.</i> |
| <i>Fatsia papyrifera.</i> | <i>Schotia latifolia.</i> |
| <i>Ficus indica.</i> | <i>Sobralia Ruckeri.</i> |
| <i>Garcinia Xanthochymus.</i> | <i>Sophora japonica pendula.</i> |
| <i>Ginkgo biloba.</i> | <i>Stanhopea Bucephalus.</i> |
| <i>Grevillea pyramidalis.</i> | <i>Streptosolen Jamesonii.</i> |

Tacsonia Van-Volxemii.

Thuja pisifera.

Tibouchina Benthamiana.

Tilia mandshurica.

Trachycarpus excelsus.

Wallichia caryotoides.

Yucca aloifolia.



FIG. 108.—*GARCINIA XANTHOCHYMUS.*

This tree is wrongly labelled in the Garden *Garcinia dulcis*; the plant is a particularly handsome and well-grown specimen.

Among the most notable plants in the Garden *Dombeya Wallichii* (= *Astrapaea Wallichii*) when in bloom is wonderfully beautiful with clusters of flowers hanging on the thinnest of long foot-stalks; the flowers are of a fine rose colour, and the leaves large, cordate, and lobed. There is a scarlet variety of this in some Madeira gardens, but the clusters of flowers are not pendulous. In Nicholson's "Dictionary of

Gardening" *D. Wallichii* is wrongly described as being of a scarlet colour.

Cassia ferruginea is a fine tree having pinnate leaves, with as many as thirty-six pairs of pinnae in some leaves, and pendulous racemes of pleasantly scented yellow flowers.



FIG. 104.—*PANDANUS UTILIS* IN THE FOREGROUND, SHOWING THE FRUIT.

This tree is labelled wrongly *P. odoratissimus*, from which it differs widely. The peculiar habit of sending down rootlets from the parent stem is very noticeable, giving the appearance to some specimens of being supported and resting only upon a series of tripods.

Chorisia crispiflora, belonging to the Bombaceae, an order including some of the handsomest of Madeira trees, grows in many parts of the island, and there are two magnificent specimens in the Deanery garden at

Funchal. *Eriodendron leiantherum* has strange white woolly flowers
Bombax Ceiba large pale red flowers and palmate leaves with five leaflets.

Dichorisandra thyrsiflora is a beautiful shrubby plant belonging
 to the Commelinæ, with large spikes of fine orchid-like blue flowers



FIG. 105. --SOLANDRA GRANDIFLORA.

There is not a specimen of this in the Garden, but it is seen everywhere in
 Madeira. Nothing can excel the magnificence of this climbing shrub when
 in full bloom, with its masses of enormous peach-coloured trumpet flowers
 and brilliantly glossy coriaceous leaves.

and curious canescent stems; some specimens are fifteen or more feet
 high.

Eucalyptus ficifolia is a peculiar form with pink-petalled flowers and
 deep red stamens.

Jacaranda ovalifolia is one of the glories of Madeira in the spring when clothed with clusters or panicles of its sky-blue flowers which appear before the leaves. Someone on approaching the island in the spring thought the town of Funchal was covered by blue clouds on seeing the Jacarandas everywhere in bloom.



FIG. 106.—PHOENIX SYLVESTRIS IN THE PUBLIC GARDEN, FUNCHAL.

Jossinia tinifolia (I give the name as labelled in the Gardens) is a peculiar small tree nearly allied to *Eugenia caryophyllata*, the clove tree (which furnishes the cloves of the kitchen), and has small whitish flowers with numerous dark-crimson stiff stamens.

Lagerstroemia indica is sometimes called the crape flower on account of the crimped texture of the flowers. It is a beautiful shrub, with quantities of many-flowered terminal panicles of a bright pink colour.



FIG. 107.—FROM LEFT TO RIGHT: WALLICHIA CARYOTODES, CORDYLINE INDIVISA, PHOENIX CANARIENSIS, PRITCHARDIA FILIFERA, AGATHIS LORANTHIFOLIA.

This shrub requires to be well pruned after flowering to produce a good show in the next season.

Laurus Cinnamomum is a handsome tree, the pink of the fresh young leaves giving it a beautiful appearance in the spring.

Melia Azedarach presents a beautiful appearance when covered with the lilac and very fragrant panicles of flowers. The seeds are employed in making rosaries.

Ocotea foetens (= *Oreodaphne foetens*) is one of the finest of the laurel family. The wood, which takes a beautiful polish and is extensively employed for ornamental work, gives off an extremely disagreeable odour when cut.

Phoenix dactylifera grows to a great size in Madeira, but the dates never appear to ripen. As an ornamental palm it is not nearly so graceful or luxuriant as the very closely allied *P. canariensis*.

Tibouchina Benthiana. The intense beauty of the flowers of this plant can only be realised when seen. It is rather a loose growing shrub, up to 10 feet high, with terminal clusters of dark-purple flowers.

Poinciana regia, the 'Royal Peacock' flower, greatly resembles *Jacaranda* in form and leaf, and bears loose terminal racemes of flowers in great profusion. The flowers are bright scarlet, striated with golden-yellow on the upper petal and claws. This tree flowers much better in the Canary Islands, and when in full bloom is one of the most magnificent sights in the vegetable kingdom.

Schotia brachytoma is an evergreen tree with deep-crimson flowers clustered along all the branches. It is more curious than beautiful.

Stanhopea Bucephalus has hanging clusters of flowers which resemble a flight of dragonflies and give off an almost unbearably strong odour of vanilla, only pleasant at a distance. It is extremely hardy, and is seen in hanging baskets in most Madeira gardens.

Streptosolen Jamesonii, which is labelled with the old synonym of *Browallia*, is everywhere in Madeira, and is used for hedges or covering walls, giving a wonderfully gay appearance to the gardens with its panicles of brilliant orange and red.

Sobralia Ruckeri grows well everywhere and flowers freely: it is one of the most beautiful of orchids. I have given the name of *Ruckeri* to this *Sobralia*, as the description in the JOURNAL R.H.S. applies most closely to the one grown here. I may be wrong in so naming it, and should be glad of correction if so.

ESSAYS ON EVOLUTION.

By Professor E. B. POULTON, D.Sc., &c.

A Critical Examination by the Rev. Professor G. HENSLOW,
M.A., F.L.S., &c.

THIS very interesting collection of ten essays, with an appendix and analytical index, is based upon lectures delivered between 1889 and 1907. The essays deal with most of the important matters connected with evolution as accounted for by Darwin's theory of "The Origin of Species by Means of Natural Selection." The author observes in the preface that, "above all it is the experience of the student of living nature which inspires confidence in the theory." * Darwin's own confidence in 1859 is also given in the Introduction in the words: "I cannot possibly believe that a false theory would explain so many classes of facts as I think it certainly does explain." † I will refer to these quotations again.

As the entire book is based on Natural Selection, the critic must ask the question, Is Natural Selection capable of accounting for the facts recorded, especially those connected with mimicry among insects, which occupy so large a part of the book that it might have well formed the subject of a volume by itself?

The eighth essay is entitled "Natural Selection the Cause of Mimetic Resemblance and Common Warning Colours," so that the present writer feels justified in endeavouring to prove that Natural Selection, *as Darwin described it*, is quite inadequate to account for them, inasmuch as no trace of support or proof is supplied.

In criticizing Mr. Bateson's remarks, Professor Poulton observes: "Instead of making observations fit the hypothesis, a more original method is to discourage the study by which awkward facts are likely to be yielded. That, in few words, is the treatment accorded by Bateson to adaptation." ‡ I would venture to ask if the author himself has done otherwise, or if he has not *ignored* adaptation, as realized (*without* natural selection) by Darwin in 1876, and by all ecologists of to-day. There is no reference to this in the book before us.

Professor Poulton adds that "Professor J. B. Farmer, F.R.S., has recently maintained that the explanation which Natural Selection offers of the origin and growth of certain adaptive features in plants not only fails to explain the phenomena, but actually stands in the way of an inquiry into the sequence of events by which they are developed in the individual." §

The author illustrates his objection to this by noticing that "the pigments of the moths had, as a whole, faded far more than those of the butterflies [in cases of Oriental insects]. It at once occurred

* Preface, v.

‡ Introduction, p. xliii.

† Introduction, xxvi.

§ *Loc. cit.* xliv, note.

to me that stable pigments are far more necessary for the butterfly exposed to the light of a tropical sun than for the moth flying in the evening or at night. Hence a much higher level of stability would be selected in the pigments of butterflies than in those of moths." * This is a good illustration of the usual Darwinian argument: *assuming* the necessity of the greater stability, it is *theoretically* accounted for by *selection*; but why assume (as natural selection does) that a great number were destroyed which had not the stability; whereas the sun itself might be equally assumed to be the external cause by which *all* the butterflies submitted to it acquired the necessary degree of stability? This theory requires no destruction of inadapative individuals at all.

Professor Poulton reminds us that the late Professor Max Müller "spoke of the necessity of examining and, as time passes by, re-examining the meaning of words." † No words require the application of this advice more than "Natural Selection." Fifty years have seen the phrase develop into a far wider usage than the description given of it by Darwin could warrant. As the book before us is practically based upon it, it will be as well to re-read the *locus classicus* in Darwin's work :

"Can it be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should occur in the course of many successive generations? ‡ If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that *any variation in the least degree injurious* would be rigidly destroyed. This preservation of favourable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or the survival of the fittest." §

By "injurious" we elsewhere learn that Darwin meant "inadapative," and by favourable "adaptive."

The reader cannot help observing the very hypothetical style of the above paragraph; moreover, we have Darwin's assurance that "Natural Selection" is merely a metaphor, because "it implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life," so that "it may metaphorically be said that natural selection is daily and hourly scrutinizing throughout the world the slightest variations." ||

The few words I have italicized strike at the root of natural selection; for no one has ever recorded a single instance of a growing plant or animal developing a *new variation injurious to itself*. What really happens under "changed conditions of life" is either for all the individuals to acquire "definite" adaptive variations, or simply *to die*. For natural selection "indefinite" variations are required; *i.e.* the mixture of good and bad variations in different individuals. Unfortunately for his theory,

* *Loc. cit.* p. xlv.

† *Loc. cit.* p. 46.

‡ Darwin does not here say "how"; but in his other work (*An. and Pl. under Dom.* ii. 271) he attributes variations to the *direct action of changed conditions of life*.

§ *Origin, &c.* 6th Ed. p. 63.

|| *Origin, &c.* p. 65.

"indefinite" variations never occur. Darwin has given plenty of illustrations of definite, but none of "indefinite results of the changed conditions of life." * He says the former are "plentiful." †

The first essay is "A Naturalist's Contribution to the Discussion of the Age of the Earth." It is a most interesting one in itself; but we are no nearer the answer to the question—How long does it take to make a species? Natural selection *must*, on the laws of chances, require an immense time; but the law of "response with adaptation" will make one in a few generations, as in pigeons and many cultivated plants; for differences arise quite equal to those by which some systematists differentiate species. The incapability of interbreeding is no test of a species (as Huxley seemed to maintain), as many breed freely together, e.g. *Medicago sativa* × *M. falcata*, widely grown on the Continent. I have practically turned *Ononis spinosa* into *O. repens*, by growing it in damp soil and air, in two years.‡ Consequently we need only follow Huxley's advice: "If the geological clock is wrong, all the naturalist will have to do is to modify his notions of the rapidity of change accordingly." §

Professor Poulton alludes to the many wingless insects in Madeira. Darwin's theory was "that the wingless condition of so many Madeira beetles is mainly due to the action of natural selection, but combined, probably, with disuse." || He refers to the idea that they were blown out to sea; but as Madeira is thirty-four by twelve miles and Jersey, which abounds in butterflies—much more likely to be blown away than beetles—twelve by seven, it is difficult to accept such a cause of their disappearance.

The second essay is on the question, "What is a Species?" Evolution, of course, displaced the old idea of fixity of a species, because of its assumed creation once for all; but from what has been said of all want of basis of the theory of natural selection, one can hardly accept the description of it as a "great motive power to evolution." ¶ According to Darwin it is no "power" at all, but only a metaphor.**

In discussing cross and self-fertilization of plants, it appears that Professor Poulton is not aware of all that has been written upon the subject.†† It has long been shown that crossing as done by cultivators is only a temporary stimulus, as, indeed, Darwin's own experiments proved, and that the "finer" the "form" of the florist's flower may be, the less chance is there for securing seed; so that in some cases the "best" die out altogether, just as pigeon-fanciers lament that "the best die in the nest."

In this essay Professor Poulton touches on direct adaptation, and quotes Professor Farmer as saying that there is "a probable prevalence in the plant-world of a constant specific mechanism that is able to be actuated in different ways by different kinds of stimuli." ‡‡

This appears to be pretty much the same thing as the power of the protoplasm and nuclei to respond to, and make structures adapted to, the

* See *An. and Pl. under Dom.* ii. p. 271.

† Letter to Professor M. Wagner (*Life*, &c. iii. p. 159).

‡ *Heredity of Acquired Characters in Plants*, p. 32, fig. 3.

§ loc. cit. p. 5.

|| *Origin*, &c. 1st Ed. p. 136.

¶ *Essays*, p. 58.

** *Origin*, &c. 6th Ed. p. 63.

†† See *Self-Fertilization of Plants*. Trans. Lin. Soc. 1877.

‡‡ *Essays*, p. 74, note 2.

"changed conditions of life." This is the conclusion of all ecologists to-day.

We now come to "Theories of Evolution." With regard to the Lamarckian and the Spencerian adaptation of it, Professor Poulton says: "If it is true that such [acquired] characters are transmitted, then the foundation of the theory is secure."*

The professor mentions a common question: "Why do we not find in the palæontological series the records of individual failures?" just as one asks, "Why do they not occur now wherever seedlings grow up under 'changed conditions of life'" as when the seeds have come from distant localities? The author replies: "What is a failure? Failure means, according to natural selection, the failure to produce offspring." This, however, is *not* Darwin's description, but an obvious *result*. The "failure" first occurs in the young organism developing some "injurious" variation,† which kills it before it arrives at maturity.

Professor Poulton, like Dr. Wallace, says: "We cannot expect to find evidence of the survival of the fittest among the individuals of a species."

One at once asks, Why not? According to Darwin, we ought to see them everywhere, that is as soon as seeds are sown, whether naturally by dispersion, or artificially by man, in some strongly marked differences of the surrounding conditions. Darwinians have made this statement repeatedly, but no reason has ever been forthcoming to support it.

On the other hand, whenever we look for the "results of the direct action of changed conditions of life," Darwin's own way of accounting for new species,‡ they, *i.e.* the resulting variations, are *always* and in *every individual* "definite," *i.e.* in adaptation to the new environment. The above admission appears to be due to the fact that "indefinite" variations never do exist. No ecologist of to-day can recognize any value in such an admission.

The author mentions another objection: "Natural selection, it is said, can never account for the beginnings of things. Until the organ is raised to a useful level, selection can have nothing to do with it." Professor Poulton replies: "At first sight this is a serious objection, but it suggests its own answer, *viz.* that an organ so rarely develops *ab initio*." But, would be the retort, "*every organ* must have done so once."

Here, again, Darwin's explanation appears to be forgotten. The commencement of an organ is a new "favourable" or adaptive variation, the individual variation enables it to survive. It is *only* the individuals with "injurious" variations which perish—or would, if any such existed.

Chapter IV. deals with "Theories of Heredity," and Professor Poulton discusses the two well known, *viz.* Darwin's theory of pangenesis, to account for the transmission of acquired somatic characters, and Weismann's, which limits it to such influence as can reach the germ-plasm. The author shows that pangenesis has too many difficulties to make it acceptable; but "if the effects of use and disuse are transmitted, the

* The reader will find ample proofs of this in *The Heredity of Acquired Characters in Plants*, by G. Henslow.

† *Origin*, *dc.* 6th Ed. p. 68.

‡ *An. and Pl. under Dom.* ii. 271.

explanation must be sought in an hypothesis constructed on the lines of pangenesis."*

On the other hand, he says that: "If the transmission of acquired characters were proved to be an undoubted fact, Weismann's hypothesis of heredity would inevitably collapse."†

The author observes: "The apparently hereditary effects of disuse are more probably due to the cessation of Natural Selection, which can no longer maintain the efficiency of a useless part."‡ But why may not the degeneration, say, of the toes of the cow and horse be due to the decreased flow of blood for many generations until the organ has atrophied, and so become hereditary? This, as a theory, is far simpler than that myriads of cows and horses born should die, leaving only those with enlarged central toes suitable for habits of life. Or why may not the *power* to produce them cease, as well as the organ itself degenerate? Rudimentary organs in both kingdoms are innumerable and obviously *not wanted*; so that induction, or the "accumulation of probabilities," sufficiently establishes the belief in the effect of use and disuse being hereditary.

Professor Poulton is evidently not aware of the vast number of proofs of the *heredity of acquired characters in plants*.

The present writer would suggest that it is not only the details of the *material machinery* (the structure of nuclei) to which we must look, but also to the *forces at work in building up an organism*. *No known force can direct itself*; it remains potential until *something*, not itself, sets it going. *E.g.* a batsman drives the ball *between* two of the opposing field; the force resides in his muscles, but the *direction* of the force is from a totally different source—his mind. Now, the structure of animals and plants depends entirely upon physical matter and force; but the latter "drives" the former in innumerable directions; so that lime is sent to the bones, silica to the teeth, salt to the tears, &c.; while elements are made to combine in scores of places specially localized for their compounds, as bile.

What directs all these physical forces, which in turn act upon matter?

Professor A. H. Church, F.R.S., finding that he can make many "organic" substances in his laboratory, asks the question: "What takes my place in the plant or animal which makes precisely the same products?"

It is quite certain that the elements cannot make compounds located in definite places; so he calls this remarkable feature of life "directivity."

It appears—*e.g.* in the result of a direct response to external action—that the Virginia creeper *at once* develops adhesive pads at the tips of its tendrils as soon as contact with a rough wall is "felt." Such are not hereditary, but have to be made only by contact; but the Japanese species now prepares the pads *in anticipation* of contact, but only completes them after it. Such, then, *are* an hereditary acquired character.

This idea of directivity will have to be reckoned with in future theories of heredity and evolution.

Essay VI. contains "A Remarkable Anticipation of Modern Views on Evolution," by J. C. Prichard, whose "Researches into the Physical

* *Essays*, p. 126.

† *Loc. cit.* p. 132.

‡ *Loc. cit.* pp. 137, 138.

History of Mankind" (2nd Ed. 1826) "anticipated in the clearest manner the arguments which have been recently advanced by Weismann in favour of the non-transmission of acquired characters." * The following sentence is exactly such as the present Darwinian followers of Weismann write: "Whatever varieties are produced in the race, have their beginning in the original structure of some particular ovum or germ, and not in any qualities superinduced by external causes in the progress of development." †

But "Prichard subsequently reconsidered all his suggested causes of variation and was dissatisfied with them; . . . for the influence of climate seemed to him the most important of all causes of race-formation." In fact he appears to have forestalled the conclusions of ecologists of to-day; and, like Darwin himself, who superadded, if he did not put on one side, his primary theory of *indefinite* variations, which natural selection requires, for *definite* variations which require no selection at all, Prichard thus writes: "Is it not probable that the varieties which spring up within the limits of particular species are further adaptations of structure to the circumstances under which the tribe is destined to exist?" Professor Poulton adds: "It is clear that the writer held a view similar to that which has been termed 'self-adaptation' by some modern writers—viz. that external influences act on the organism in such a manner as to evoke directly a favourable response." ‡

Prichard observes how "individuals and families, and even whole colonies, perish and disappear in climates for which they are by peculiarity of constitution not adapted." "We have here," writes Professor Poulton, "the undoubted recognition of natural selection." But the professor fails to see that he is extending the meaning beyond that which Darwin gave to it—viz. *the survival of the fittest out of a mixture of adaptive and inadaptive variations*.

If one takes a number of seeds of tropical plants and sows them in the Arctic regions, even if they germinated, they would undoubtedly *all* perish, not because of their developing "injurious" characters, but because the living protoplasm has not adapted itself to bear a temperature below freezing; whereas the protoplasm of Arctic plants can stand freezing; so that a herb in full blossom may be frozen hard and be quite brittle, yet as soon as the temperature rises it will continue where it left off blossoming and fruiting. All this is not at all in correspondence with Darwin's description of natural selection. §

Finally, Professor Poulton observes: "He is so fascinated by the view of a local influence directly producing adaptation that he throws over much that he had previously argued for in a most convincing manner." The fact is, that as soon as any observer realizes the force of a single instance he will be "invincibly" led (as M. Costantin says) to accept the view of direct adaptation. ||

From page 208 to the end of the book (p. 398) the author deals with mimicry in insects, and refers all the phenomena to the explanation by

* *Loc. cit.* p. 174.

† *Loc. cit.* p. 183.

‡ Henslow, *Heredity of Acquired Characters*, p. 190.

§ *Origin, &c.* 6th Ed. p. 68.

|| *Les Végétaux et les Milieux Cosmiques*.

natural selection, describing it as *the motive cause of mimetic resemblance*. Darwin was most careful to point out that it does not "induce variability," but "implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life." It is these "conditions" which by their "direct action" give rise, by response on the part of the organism, to "definite results." * Hence to describe natural selection as the "cause" of anything is contrary to Darwin's theory.

Seasonal changes, not only shown in nature, but by Mr. Marshall's experiments, clearly prove that the conditions of life were the cause, and not natural selection. This is paralleled by more rapid changes in mimetic colours in flat-fish, trout, frogs, and especially the chameleon; so that *probabilities* favour Darwin's "cause." A remarkable case is the tropical male *Hypolimnas misippus*, mimicked in China by *Limenitis albomaculata*, and also by *Athyma punctata*—all three are black and white butterflies. "There was, in fact, from the very first, sufficient likeness for Natural Selection to work upon." But surely, judging by all analogy, "similar conditions of life will ensure similar developments" is a sufficient and better explanation than the unproven one of natural selection, which is based on "We may feel sure that any variation in the least degree injurious would be rigidly destroyed." Professor Poulton adds that mimicry is "known by a vast body of observations which receive an intelligible interpretation under this theory, but not under any other." † This may be true if any evidence could be found of "indefinite variations" upon which natural selection is based.

Professor Poulton truly says: "We believe in evolution, not because we see it taking place, but because of the immense number of observed facts which it renders intelligible; and the same is true of our confidence in the Newtonian theory." This is a concise description of *induction*; but we *can* see evolution taking place whenever an organism grows up under "changed conditions of life" and adapts itself to them both in nature and cultivation.

Professor Poulton says: "It is impossible to explain why external forces or internal forces should act upon a certain set of characters whose only relationship is that they tend to produce a superficial likeness to another species." ‡ This is perhaps true for the animal world especially, at present; so is it impossible to explain how the pitcher of *Nepenthes* (a hypertrophied water-gland) and that of *Cephalotus* (a true leaf-blade) have come to be so closely alike; yet the result of self-adaptation *without* natural selection is so universally seen in plants that the probability is that exceptional cases will fall into line when more is known about them.

In conclusion, I will return to the first page and refer to the idea of "confidence" in the theory. This confidence is everywhere observable throughout the book. Every fact is explained by natural selection; but in no single case does the author supply the necessary conditions as existing, or ever having existed, without which natural selection falls to the ground. Thus Professor Poulton says: "A mimetic appearance is commonly made up of (1) colour, including (a) structural as well as

* *Essays*, p. 218.

† *Loc. cit.* p. 237.

‡ *An. and Pl. under Dom.* ii. p. 271

(b) pigment colours ; (2) pattern ; (3) form ; (4) altitude ; (5) movement.* Now for each of these items there must have been innumerable *deaths*, from not only *not* having the desired sort, but by developing "injurious" variations.† Has any *trace* of such been observed in Nature?

It would seem that the prevalent "confidence" in natural selection entirely rests on the *assumption* of its efficacy. If so, then the general belief in it is accounted for ; but, I repeat, no Darwinian ever gives a sign of having "fitted a case" to Darwin's demands for the conditions required by natural selection, which are "indefinite variations," in which the majority of the individuals *must* perish because they develop in themselves mortal variations. Such is the basal assumption of Darwinism.

Putting natural selection on one side, the book is a very valuable contribution to the literature of evolution, and will be the standard work on animal mimicry.

* *Loc. cit.* p. 241.

† *Origin*, &c. p. 63.

HYBRIDS OF *NERINE FLEXUOSA*.

By A. WORSLEY.

IN the "Gardeners' Chronicle" for January and February 1901 the author gave a fairly complete list of the hybrids which had been raised between the various species of exotic *Amaryllideae*. Since that time several fresh hybrids have been raised, and much work has been done in raising afresh several of the hybrids originally raised by Dean Herbert but long since lost. It seems therefore desirable that that list should be supplemented so as to include the more recent work.

The following notes clear up some confusion which has existed in the nomenclature of certain hybrid *Nerines*.

A LIST OF THE SIX HYBRIDS OF *N. FLEXUOSA* [including those of the varieties *Sandersoni*, *pulchella*, and *angustifolia*].

The following four hybrids generally resemble the well-known hybrid *Manselli* in every respect but in the colour of the flowers, which ranges widely from the intense claret crimson of *Manselli* to the faintest blush pink, or almost to white. They all flower in November, December, and early January, and they are all sterile.*

N. flexuosa × *curvifolia* produces *Haylocki* [syns. *cinnabarina* and *Manselli*.]

N. flexuosa × *sarniensis* produces *atrosanguinea* [syn. *elegans*†].

N. flexuosa × *pudica* produces *flexudica*.

N. flexuosa × various large-flowered garden forms and species produces *tardiflora*.

The following hybrid only differs from the above in flowering in early autumn:—

N. flexuosa × *humilis* produces *excellens* [syns. *pulchello-humilis* and *mutabilis*].

The following hybrid flowers in November and resembles a fine, many-flowered form of *N. undulata*:—

N. flexuosa × *undulata* produces *crubescens* [syns. *pulchello-undulata* and *roseo-crispa*].

All these synonyms should be expunged.

As regards the first four hybrids and crosses of the *Haylocki* (*Manselli*) type, I do not think that anyone can differentiate between the resulting progeny, although it is possible that the *pudica* hybrids could be picked out from the others. Yet the question of nomenclature is important, because this splendid section of winter-flowering *Nerines*

* Herbert states that his hybrid *N. Haylocki* produced fertile seeds from its own pollen, but it is not on record that he succeeded in raising any seedlings.

† A number of different forms of garden *Nerines* have (improperly) received this name.

must very soon become popular, and known to hundreds of gardens under whatever names they may bear, and however incorrect or synonymous such may be.

N. Haylocki, *excellens*, and *erubescens* (the two latter under synonyms now considered inadmissible) were raised by Herbert; *N. tardiflora* and *N. flexudica* * were raised (but the latter not named) by Max. Leichtlin; and *N. atrosanguinea* was raised by O'Brien.

There is one remarkable result seen in these hybrids of *flexuosa*, and that is that only two hybrid types have been produced. The one is the *Manselli* type (which should be called *Haylocki*), and which is the product of crossing *flexuosa* with any of the following very dissimilar species, viz. *curvifolia*, *humilis*, *sarniensis*, *pudica*, or any of the large-flowered garden Nerines. The other type is that of *erubescens*, which results from crossing *flexuosa* with *undulata*. In this latter case *undulata* has proved dominant over *flexuosa* in most respects, and the hybrid is little more than a fine form of *undulata* with a compact and crowded umbel. Yet even in this case the season of bloom is very late, as is the case with every hybrid of *flexuosa* excepting only the crosses with *humilis*.

In connection with these six hybrids of *N. flexuosa* it is necessary to pay special attention to a variety of this species named *pulchella*. This is the only form of *flexuosa* which blooms in England about September, and there were not wanting those who held that on this account, and for some other minor divergences from the type, *pulchella* was worthy of a specific name. But the judgment of Mr. J. G. Baker in placing *pulchella* as a variety of *flexuosa* has been amply vindicated by the results of hybridization. For of all the hybrids and cross-bred plants raised by early-flowering Nerines upon *pulchella* all but one have produced offspring which bloom in winter at the blooming period of the typical *flexuosa* and its hybrids. The one exception to this rule is *N. excellens*. This early-flowering hybrid was originally raised on *N. flexuosa* var. *pulchella* by Herbert; but the same early-flowering hybrid has also been raised on the typical form of *flexuosa* according to Mr. J. G. Baker.† Hence it is evident that there is in this species a certain tendency to precocious flowering which is discernible at times, and finds its exemplification in the variety *pulchella* and in the hybrid *excellens*.

I can hardly understand the remark of Herbert (p. 284) that hybrids raised on *flexuosa* by "*curviflora*" (presumably a misprint for *curvifolia*) "show the type of the male much more strongly in the foliage, and grow more freely," for with me no Nerines grow so strongly and produce such exuberant foliage as the hybrids of *flexuosa*. Probably the explanation is that he grew all his Nerines together and dried them off severely. Under this treatment the *curvifolia* section would flourish and the *flexuosa* section languish.

It is the experience of several hybridizers of this genus, confirmed by my own observations, that all hybrids of *flexuosa* are sterile, the only observation to the contrary being made by Herbert (see note on p. 488). Yet this sterility is not a common attribute of all hybrid Nerines.

* Perhaps this hybrid was first raised by Mr. H. J. Elwes.

† *Handbook of Amaryllideae*, p. 108.

I have assumed that all hybrids raised between varieties of *flexuosa* and other species (or varieties of such other species) produced the same hybrids as were produced by the interbreeding of typical forms. In other words I have altogether ignored all question of varietal forms. I have also ignored the question of mother-kin. Certainly from the florist's point of view the question of variety and of mother-kin may be of great importance, but from the standpoint of botanical nomenclature it is now generally accepted that neither of these causes influences hybrid characters to any appreciable extent. Personally I make this reservation, that I do not accept these allegations of sameness as having been proved ; but at the same time sufficient evidence has been accumulated on which to found a working hypothesis of sameness.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

V.—THE INOCULATION OF LEGUMINOUS CROPS (*cont.*).

By F. J. CHITTENDEN, F.L.S.

IN the last issue of the JOURNAL (pp. 281–254) an account of the experiment carried out at Wisley during 1908 upon the Inoculation of Peas with “Nitro-Bacterine” was given. The results indicated that such inoculation in *ordinary garden soil* is not likely to prove beneficial.

A full account of the plan of the experiment and the nature of the soil, &c., is given on pp. 236–242, and the numbers used to designate the plots in the tables which follow correspond with those on the plan (fig. 37, p. 237).

Of the twenty-four rows of peas grown from inoculated seed on the cultivated land, only five gave a larger crop than the corresponding rows from untreated seed. Of the six plots on which inoculated seed was sown only one gave a larger crop than the corresponding uninoculated plot, and one gave an equal crop. Of the twenty-four rows grown from inoculated seed on the fallowed land, eleven gave a larger crop than the corresponding rows from untreated seed and thirteen a smaller. Of the six plots on which inoculated seed was sown, four gave larger crops than the corresponding uninoculated plots. In all cases the weight of the pods as gathered is taken as the measure of the yield.

The total weight of produce from the inoculated plots was incorrectly stated in the Summary, though it was given correctly in the body of the Report, and I take this opportunity of rectifying the error. Paragraph 9 of the Summary (p. 254) should read: “The total weight of the crop from the whole of the plots receiving inoculated seed was 495 lb. (*not* 450 lb. as stated), while the total from the plots in which uninoculated seed was sown was 515 lb. The uninoculated seed, therefore, gave a crop 4 per cent. (*not* 14 per cent.) heavier than the inoculated in the aggregate.”

The crop from the inoculated seed (138,123 grammes) on the cultivated ground was 6 per cent. less than that from the uninoculated (146,648 grammes) in the aggregate, and on the fallowed ground there was a difference in favour of the inoculated seed of less than 1 per cent. (86,642 grammes from the inoculated seed, 85,942 grammes from the untreated seed).

All these results are based upon the assumption that, under equal conditions, equal weights of seeds would produce equal crops (see p. 240 for the reason for using this as a basis of calculation), but, as pointed out in the Report (pp. 240, 247, 249, &c.), in a few cases there was a marked difference in the number of plants growing on the two plots which were to be compared.

It might, therefore, be thought that this difference in number of plants may have made an appreciable difference in the aggregate results, and on

the conclusions to be drawn from them. This was very unlikely to be the case, for on account of the arrangement of the plots (see fig. 87, p. 287) local conditions would not be very liable to affect the plots receiving inoculated seed adversely while the corresponding plots receiving untreated seed remained uninfluenced.

In an experiment such as this, planned to test what is likely to happen in a garden under ordinary conditions, the only basis of calculation which can properly be adopted must be to take the crops as they actually occur. The question of the variation in the number of plants does not, therefore, affect the result from a practical garden point of view, when it is borne in mind that one of a pair of plots, was, apparently, no more exposed to adverse conditions than the other, and that each of the pair received the same weight of seed, but from a scientific standpoint the question is not without interest.

In order to test the question as to how far the varying number of plants in the corresponding plots affected the general results, and especially the question of the efficacy or otherwise of inoculation, we may ascertain the average yield of the plants on each of the corresponding plots and compare these yields.

Unfortunately, the figures relating to the number of plants of the varieties 'Duke of Albany' and of 'Telegraph' in the rows were accidentally lost, but we have those relating to 'Ne Plus Ultra' and to 'Maincrop' and it was in the last named that the greatest amount of variation in the number of plants in the rows was noticed (see previous Report). We are thus able to compare the average yields of plants from forty-eight rows distributed equally over the several plots, half having been raised from inoculated seed and half from uninoculated.

The number of plants given in the rows in the following tables means the number that came to maturity in each case. The treatment received by the respective plots has been fully dealt with in the former Report.

We may take the results obtained on the cultivated ground with 'Ne Plus Ultra' first:—

TABLE Q.

* AVERAGE YIELD OF PLANTS OF 'NE PLUS ULTRA' FROM PLOTS I. TO XII.
(CULTIVATED GROUND).

Seed not inoculated				Seed inoculated				Percentage increase or decrease	
	No. of plants	Aver. wt. of pods	Aver. wt. of peas		No. of plants	Aver. wt. of pods	Aver. wt. of peas	Wt. of pods	Wt. of peas
Plot I.	71	grs. 70.4	grs. 34.1	Plot II.	78	grs. 61.4	grs. 28.9	-13	-15
" IV.	61	91.8	44.1	" III.	65	69.9	32.9	-24	-25
" V.	69	85.5	41.0	" VI.	60	95.4	43.2	+11	+5
" VIII.	50	100.1	45.9	" VII.	63	98.7	47.6	-2	+3
" IX.	54	118.6	55.7	" X.	58	103.9	47.5	-13	-15
" XII.	48	144.2	65.0	" XI.	60	116.4	54.1	-20	-17
	353	98.7	46.3		384	89.2	41.7	-10	-10

All weights are given in grammes.

There was a decrease of 10 per cent. in the average yield from inoculated plants as compared with the uninoculated, and a decrease was shown in four out of the six rows in weight of peas and five out of the six in weight of pods as gathered; the results obtained by taking the total yield of each row of 'Ne Plus Ultra' for comparison, instead of the average yield from each plant in the respective rows, showed a decreased yield of shelled peas from the inoculated rows in four cases out of six and of pods as picked in four cases, while in one the yields were practically equal.

The results obtained by the two methods thus completely support one another.

Turning now to the variety 'Maincrop' on the cultivated ground we have the following figures:—

TABLE R.

AVERAGE YIELD OF PLANTS OF 'MAINCROP' FROM PLOTS I. TO XII.
(CULTIVATED GROUND).

Seed not inoculated				Seed inoculated			Percentage increase or decrease	
	No. of plants	Aver. wt. of pods	Aver. wt. of peas		No. of plants	Aver. wt. of pods	Aver. wt. of peas	
Plot I.	49	grs. 86.5	grs. 43.1	Plot II.	44	grs. 94.1	grs. 44.7	+ 8
" IV.	52	95.3	46.6	" III.	34	93.6	55.1	- 2
" V.	41	118.4	52.3	" VI.	47	93.6	45.9	- 21
" VIII.	49	115.0	51.5	" VII.	44	106.8	50.8	- 8
" IX.	43	132.1	61.2	" X.	33	112.4	50.4	- 15
" XII.	32	125.9	54.9	" XI.	38	126.5	52.8	0
	266	110.5	51.1		240	103.9	49.6	- 6

In this case there was a decrease of 6 per cent. in the average weight of pods as picked from the inoculated plants as compared with the uninoculated, and of 3 per cent. in the weight of shelled peas, and a decrease was shown in four rows of the six in each estimation of the crop. The results obtained by taking the total yield of each row of 'Maincrop' for comparison, instead of the average yield from each plant in the respective rows, showed a decreased yield of pods as picked from the inoculated rows in four cases out of six, and the same proportion of cases of decreased yield when the weight of shelled peas was compared.

Both methods of measuring the yield, therefore, tell the same tale when the peas grown on the cultivated soil are compared.

It is interesting also to compare the average yields from the plants in the first four plots. In the variety 'Ne Plus Ultra' the lowest average yield was on Plot II., which received inoculated seed, the soil as well being inoculated, and on this plot with 'Maincrop' was the lowest average yield but one.

The next table gives the average yield for the plants in the rows of 'Ne Plus Ultra' on the ground which had been fallowed:—

TABLE S.
AVERAGE YIELD OF PLANTS OF 'NE PLUS ULTRA' FROM PLOTS XIII. TO XXIV.
(FALLOW GROUND).

Seed not inoculated				Seed inoculated				Percentage increase or decrease	
—	No. of plants	Aver. wt. of pods	Aver. wt. of peas	—	No. of plants	Aver. wt. of pods	Aver. wt. of peas	Wt. of pods	Wt. of peas
		grs.	grs.			grs.	grs.		
Plot XIII. .	83	62.9	30.6	Plot XIV. .	73	67.8	35.4	+ 7	+ 12
" XVI. .	60	87.6	42.1	" XV. .	67	75.0	36.5	- 15	- 14
" XVII. .	55	95.3	45.3	" XVIII. .	59	86.8	42.0	- 9	- 8
" XX. .	24	111.0	50.0	" XIX. .	38	102.6	48.1	- 8	- 4
" XXI. .	50	80.5	38.6	" XXII. .	29	100.5	48.0	+ 24	+ 23
" XXIV. .	25	80.3	38.0	" XXIII. .	25	64.0	27.1	- 20	- 29
	297	82.5	39.2		291	80.8	39.2	- 3	0

In this series there is on an average a decrease of 3 per cent. in the weight of pods produced by each plant from the inoculated seed, while the weight of peas is on an average the same. In each series of weighings four rows show a decreased yield from the inoculated seed. This compared with five decreased yields from inoculated seeds when the totals are compared, though the percentage decreases in the total yields are, for the most part, smaller than decreases shown when the average yields of the plants are considered.

There remain the rows of 'Maincrop' on the fallowed land, and the following table shows the average yield for each plant from these:—

TABLE T.
AVERAGE YIELD OF PLANTS OF 'MAINCROP' FROM PLOTS XIII. TO XXIV.
(FALLOW GROUND).

Seed not inoculated				Seed inoculated				Percentage increase or decrease	
—	No. of plants	Aver. wt. of pods	Aver. wt. of peas	—	No. of plants	Aver. wt. of pods	Aver. wt. of peas	Wt. of pods	Wt. of peas
		grs.	grs.			grs.	grs.		
Plot XIII. .	54	63.4	28.9	Plot XIV. .	49	79.0	39.3	+ 24	+ 36
" XVI. .	35	69.0	31.8	" XV. .	46	89.7	43.4	+ 30	+ 35
" XVII. .	54	71.8	33.0	" XVIII. .	35	66.1	29.8	- 8	- 10
" XX. .	33	29.0	13.7	" XIX. .	24	28.2	13.0	- 3	- 6
" XXI. .	52	40.5	17.7	" XXII. .	15	42.9	19.5	+ 5	+ 10
" XXIV. .	38	34.0	15.1	" XXIII. .	35	26.8	11.7	- 23	- 23
	266	52.5	24.1		204	61.7	29.3	+ 17	+ 21

With this variety for the first time we find a considerable increase in the average yield from the inoculated plants compared with the

uninoculated, but even here there are three out of the six rows giving a smaller average yield from the inoculated seeds. In comparing the total yields from the different plots it was found that four of the plots gave a higher yield from the uninoculated seed (the last four). Here again, therefore, the two methods of estimation to a great extent support one another.

In the twenty-four pairs of rows seven only gave a greater average weight of pods from each plant in the inoculated rows than in the uninoculated, in one case the average was the same in the two rows and in sixteen a diminished average yield was shown.

Either inoculation had no effect whatever, or it had an adverse effect in a majority of cases. If the former suggestion be true, then the yield from comparable plots must vary normally between very wide limits; if the latter, we must account in some way for the adverse effect.

It cannot justly be concluded from the results of this experiment that the inoculation actually caused a diminution in the yield, for in the case of such exact comparisons as would enable this question to be definitely answered the space occupied by a given number of plants must be the same in the two rows (albeit, the plants in this experiment all had ample room for development), and other precautions would have to be taken which are practically impossible in a field or garden trial. The results detailed here, however, as well as those obtained by the method of calculation adopted in the former portion of this Report (the method by which comparison would be made in an ordinary garden trial), suggest the possibility that certain races of the bacilli which produce the nodules on the roots of peas are capable of fixing a greater amount of nitrogen than are other races, and that a race more powerful in this direction than that in "Nitro-Bacterine" may be actually present in the soil already.

The roots of all the plants, as previously pointed out, were well supplied with nodules, and apparently the experiment resolved itself into a competition between the races of bacteria already in the soil and those added in the inoculation of the seed. The much more frequent association of the native bacilli with the larger yield makes the question of the relative virulence of the races a very pertinent one, but it can only be settled after further investigation; as suggested in the introduction to the Report (p. 235), it may be a question of the gravest importance.

Another hypothetical suggestion may be offered to account for the apparent adverse influence of inoculation. Is it certain that very early inoculation is as beneficial to the host plant as later inoculation? Possibly, with a race of bacteria which have recently been in active growth, the power of rapid infection may be greater than that of those which have lain dormant in the soil for some time, and nodules might be formed earlier. We have no data showing that such earlier nodule formation occurs, however; but it is conceivable that if it were so, since it is probable that the bacteria are for a time at least parasitic, harm might be done at a critical period of the plant's existence. Or, again, the bacteria might be manufacturing and handing on to the young plant materials which it could not, at that stage of its existence, profitably make use of.

A comparison of the average yields of the plants serves to confirm and to emphasize the conclusion arrived at in the former portion of the Report "that inoculation of leguminous crops with 'Nitro-Bacterine' in ordinary garden soil is not likely to prove beneficial."

Effect of Watering Plants with "Nitro-Bacterine" during Growth.—The effect of inoculation of the soil and of the seed has been dealt with in the former Report, but a third mode of inoculation has been recommended, that of watering the plants after they have made some growth. Six rows of seeds of 'Maincrop' were sown in a parallel series with the first six rows on the fallowed ground. Thus the first two of these rows were sown upon inoculated soil, the next two on uninoculated unmanured soil, the last two on soil which had received a light dressing of dung at the rate of ten tons to the acre. The first three rows were watered on May 19 with culture-broth of "Nitro-Bacterine," in which the bacteria were well grown, diluted twenty-four times with water; the other three rows were watered with a solution of ammonium phosphate of the same strength as that in the culture-broth, so that the last three rows were treated like the first three so far as the late inoculation is concerned except that they did not receive the bacteria. Some of the seed was inoculated, some was not, as shown in Table U. There was some irregularity in germination similar to that observed in the other rows of 'Maincrop.'

This portion of the trial was far less complete than the other, but the results obtained may be useful for comparison. There was a general fall off in the total crops from the rows passing from 97 to 102 in a somewhat similar manner to, but even more marked than, that alluded to in discussing the return from the other rows on the fallowed ground, as is shown in Table U.

TABLE U.

PRODUCE FROM ROWS 97 TO 102.

Row	Treatment	No. of plants	No. of pods	Wt. of pods grs.	Wt. of peas grs.
97	Soil inoculated	51	484	3,008	1,623
98	Seed untreated				
	Soil inoculated				
99	Seed inoculated	51	402	2,591	1,455
	Soil untreated				
100	Seed inoculated	45	362	2,518	1,368
	Soil untreated				
101	Seed untreated	34	312	2,085	1,066
	Soil manured				
102	Seed untreated	37	346	2,405	1,191
	Soil manured				
	Seed inoculated	26	281	1,755	881

But when the average yield of the plants in the respective rows is worked out, the larger crops of the first three plots are shown to be mainly attributable to differences in the numbers of plants in the respective rows. These averages are given in Table V.

TABLE V.
AVERAGE PRODUCE FROM PLANTS IN ROWS 97 TO 102.

Row	No. of plants	Aver. wt. of pods	Aver. wt of peas	Percentage difference from yield in row 100	
				Wt. of pods	Wt. of peas
97	51	grs. 58.9	grs. 31.8	- 4	+ 1
98	51	50.8	28.5	- 18	- 9
99	45	55.9	30.3	- 9	- 4
100	34	61.2	31.3	—	—
101	37	65.0	32.2	+ 6	+ 3
102	26	67.5	33.9	+ 10	+ 8

The average yield of shelled peas varied within rather narrow limits; but, perhaps, the most extraordinary result is in Row 98, where the lowest average yield was obtained, and where, after the soil and the seed and the plants were themselves inoculated (a treble inoculation), the average yield of pods was 18 per cent. below that of the row which was not inoculated or manured at all, and the yield of shelled peas was 9 per cent. below.

It is suggestive, too, to compare the average yield from the plants watered with the inoculating material with those watered with the ammonium phosphate only (though on account of other differences of treatment the comparison is not quite a fair one). The average yield of the plants which were watered with "Nitro-Bacterine" in the three rows was 55.1 grammes, that of the other plants 64 grammes. The plants inoculated by watering thus gave an average yield amounting to only 86 per cent. of that of those not watered with the inoculating material.

These results, as far as they go, tend to corroborate those obtained by the other methods of inoculation, and to further emphasize the need of investigation into the relative virulence of different races of nodule-producing bacilli.

The remark made in the "Conclusion" on p. 253 that "it is not claimed for this experiment that it shows what is to be expected under all conditions, or that under no conditions is inoculation of leguminous plants likely to be followed by increased yield," may be repeated. But the results based upon the average yield from the plants in this part of the experiment point to the same conclusion as was given in paragraph 12 on p. 254 and repeated on p. 495.

SUMMARY.

1. The average yields of the plants in the different rows of 'Ne Plus Ultra' and 'Maincrop' are considered and found to corroborate the conclusion arrived at in the former Report. Only seven out of twenty-four rows of inoculated seed gave a greater yield than the uninoculated, one gave an equal yield, and sixteen gave a smaller.

2. The results obtained by watering peas with "Nitro-Bacterine" are given and point to the same general conclusions as have been previously stated.

REPORT OF THE SOCIETY'S CONSULTING CHEMIST.

By Dr. J. AUGUSTUS VOELCKER, M.A., F.I.C., F.L.S.

DURING the year 1908 eleven samples were submitted for analysis by Fellows of the Society. The list of these is as follows :—

Manures	3
Waters	2
Soils	6
	<hr/>
	11

Of the three samples of fertilizers two were those of shoddy, and these respectively gave :—

	A. Per cent.	B. Per cent.
Nitrogen	5.47	5.53
Equal to ammonia	6.64	6.71

These, at the price of 40s. a ton, may be considered quite good value.

The third sample of fertilizer was one of basic slag. This gave on analysis :—

	Per cent.
Phosphoric acid	13.24
Equal to tribasic phosphate of lime	28.93
Fineness of grinding	74.3

This sample was not of high quality, and might well have been more finely ground : 80 per cent. fineness of grinding ought, speaking generally, to be obtainable.

Of the two samples of water sent, one was of soft nature, giving only 9.52 grains of total solid matters to the gallon. This water was found to have a decided action upon metals, and it contained both lead and zinc in solution. It was found that a lead pipe had been used from the well to the cistern in which the water was stored. The action on lead was not very pronounced, and the water was found to exert this to a greater extent on new and bright lead than on old and dull lead.

The second sample of water was of a very different nature, yielding 72.52 grains of total solid matters to the gallon. These were composed principally of carbonate and sulphate of lime. The water was, in consequence, one of very hard nature. It had, in addition, nitrates and chlorides in considerable amount, and was a badly polluted supply, altogether unsuited for drinking purposes.

The majority of samples sent during the year consisted of soils. In two cases the soils were found to be distinctly deficient in lime. The only other sample calling for special attention is the following :—

A member of the Society, residing near Malvern, sent for analysis a sample of soil taken from a field which had been planted with currants, bush-apples, and strawberries. In 1905 the field had received a dressing of lime, in 1906 fish guano, and in 1907 farmyard manure. In spite of

this, however, the currant bushes had a very unhealthy appearance. I made a complete analysis of the soil, and this gave the following results :—

		Soil dried at 212° F.
Organic matter and loss on heating		4·32
Oxide of iron		3·34
Alumina		5·24
Lime		·60
Magnesia		1·39
Potash		·51
Soda		·20
Sulphuric acid		·07
Phosphoric acid		·23
Insoluble silicates and sand		84·10
		100·00
Nitrogen		·183

Taking these figures generally, there would not appear to be any one constituent that was markedly deficient, except, possibly, the organic (vegetable) matter and the nitrogen derived from this source.

There was a very fair supply of potash ; in phosphoric acid the soil was distinctly rich, while the amount of lime could not be said, in itself, to be low. A remarkable point, however, brought out by the analysis was that the amount of magnesia contained in the soil was more than double that of the lime. This is a matter to which my attention has been of late directed in a somewhat special way. Moreover, experiments conducted by myself at the Woburn Experimental Farm have brought out very clearly the influence which magnesia may exert on the crops of the farm. To briefly summarize the information gained on these points, it would appear to be brought out that whenever the proportion of magnesia in a soil exceeds the lime that is present, conditions unfavourable to the successful growth of crops are produced.

I am of opinion that to this may very well be attributed the failure of the currant bushes in the present instance.

The subject is still under investigation, but I certainly believe that the best thing to do in such a case as that mentioned is to apply lime liberally, for, while it is impossible to take the magnesia out of the soil, it is possible to reduce its preponderance by the addition of lime.

COMMONPLACE NOTES.

BY THE SECRETARY, SUPERINTENDENT, AND EDITOR.

BALANCE OF ROOTS AND BRANCHES.

It is often said by gardeners that the small fibrous roots of a fruit tree which are found fairly near the surface are those which nourish the fruit bud and the resulting fruit itself, whilst the larger and less branching deeper roots are those which promote and nourish woodgrowth and the general extension of the tree. We are not aware whether any real proof of this has ever been sought for or found, but the following case, though it does not perhaps actually prove the relation (if any) existing between fibrous roots and fruit bearing, yet distinctly suggests that the branches of a tree are nourished principally, if not entirely, by the roots by and immediately below them.

A Fellow writes "There is in my garden a well-grown horizontal pear—Beurré Rance—from which for twelve years we had not one single fruit. Two years ago we tried root pruning *on one side*. In the following autumn there was one pear—last year there were three—whilst this year the side root-pruned is covered with fruit, but there is *none* on the other." It is almost impossible to imagine that this was simply an accidental coincidence. We should like some one who possesses a fruitless tree to try the same experiment of root-pruning half of the tree and noting whether the effect is found above ground on the corresponding portion of the tree to that pruned below, or whether both sides are affected (or unaffected) alike by the treatment.

TREES AND SHRUBS WITH COLOURED STEMS.

We often hear of people planting clumps of trees in gardens and parks for the sake of their beautiful foliage or flowers, but rarely do we see groups planted with a view to obtain beautiful effects in winter from the stems alone. We all admire the beauties of the red trunks of the Scotch firs and their dark-green foliage with the sun on them in winter. The common dog-wood, *Cornus sanguinea*, is frequently seen by lake and stream margins, and very pretty it is; but if a system of massing colours were adopted, such as is in vogue in herbaceous borders, what a lovely winter scene might be achieved. Amongst the plants available is the beautiful white-stemmed bramble, *Rubus biflorus*, the scarlet, golden, and silver-stemmed willows, the silver birch, and the red-stemmed maples, all of which planted in bold clumps would be handsome when in leaf, and still more attractive when the days are dull. In many positions it would be quite impossible to plant big masses. One would have to be guided by the size of the garden and its surroundings, but in small gardens small clumps, or even single specimens, might be employed with advantage. A tree of the silver birch, particularly the weeping form, is always an

object of beauty, and the same applies to all the coloured-stemmed willows, or the weeping willows, if planted in suitable positions. The last point is one of much importance. All trees should be planted in such positions as are naturally suited for them, otherwise they appear out of character, and instead of improving the effect they are more likely to spoil existing natural beauty.

SEMPERVIVUM HOLOCHRYSUM.

W. L. Fox, Esq., F.R.H.S., of Carmino, Falmouth, sends us a photograph of this interesting succulent plant, a native of Teneriffe, which

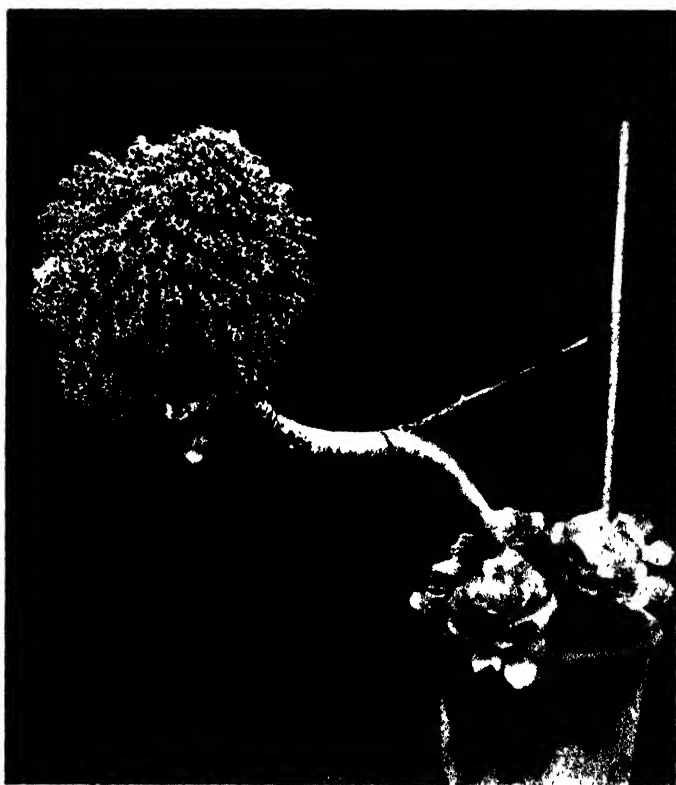


FIG. 108.—*SEMPERVIVUM HOLOCHRYSUM.*

flowered in his greenhouse in the summer of 1908. The huge inflorescence was in flower from bottom to top for a considerable time. The figure (fig. 108) shows it when in fruit, and a prodigious number of seeds must be produced by the enormous head of flowers. The offsets from the base of the plant are still in flower. The plant was introduced as long ago as 1816, and is figured in the "Botanical Register" (tab. 174).

TREE CARNATIONS AS BORDER PLANTS.

Few plants have so rapidly become popular as the tree carnations, and because of their free-flowering habit, perfect calyx, and sweet perfume

their popularity for winter flowering is likely to be maintained, and no doubt when their merits as outdoor plants are recognized they will be equally esteemed in the open. The best results outdoors are obtained from old plants that have been blooming through the previous winter and spring: they should be planted out, at the end of May, on a sunny but sheltered border, not cutting them back at all, but putting them out just as they are. For a time they will appear very shabby, and be somewhat of an eyesore, but in a very short time new growths will be made which will produce an abundance of blossoms during the late summer and autumn. The soil for the plants ought to be deeply dug, say eighteen inches deep, adding a liberal supply of well-decayed manure or well-rotted leaf soil; and if the soil is stiff and heavy, coarse sand or road grit may be used to keep it porous and warmer. If the weather is very dry after planting, copious supplies of water should be given until the plants are well established, and a good syringing occasionally after hot days is very beneficial. Later on, when the plants are established, frequent hoeing to keep a loose surface is called for, as it not only conserves moisture, but the plants thrive the better for it, and respond much better to this treatment than to feeding with chemical or natural manures. We should advise that no manure of any kind be given to the plants after putting them out in the border, as it tends to the production of foliage at the expense of the quantity and quality of the flowers.

LITTLE-KNOWN GOOD-FLAVOURED GRAPES.

There are many indications that the craze for size and appearance in fruit is on the wane, and those possessing first-class flavour are again finding favour. Among new grapes 'Prince of Wales' is sure to take a leading position, because of its splendid appearance, size, and flavour. It originated as a sport from 'Mrs. Pince,' and possesses all the excellent qualities of its parent, with the addition of a handsome bunch of perfect form, a larger blue-black berry of a roundish-oval shape, and a crisp delicious Muscat flavour. At Wisley it has proved a strong sturdy grower, free bearer, and very free setter. Another remarkably fine grape, by no means new, but seldom seen, is 'Muscat Champion,' one of the boldest berried varieties grown, quite as large as 'Gros Colmar' or 'Canon Hall Muscat,' but of a foxy-red colour, tinged with green; many not only object to this colour, but some might imagine the fruit was not properly ripe; yet, in spite of this, no finer flavoured grape is grown, and where high quality is desired it can be strongly recommended. In the Wisley collection it was much admired for its big bunches, robust habit and superb flavour. Another red or foxy grape that used to be extensively grown, but is now rarely met with, is 'Grizzly Frontignan'—the best of all the Frontignan varieties—with a long slender bunch of small red berries of the most exquisite flavour. All the Frontignans are delicious, but none will compare with the 'Grizzly.' One of the earliest and smallest berried grapes is 'Ascot Citronelle,' ripening its fruit quite a fortnight before 'Black Hamburg' growing in the same house; the flavour is excellent, the bunches rather small, but abundantly produced and the berries a lovely amber tint when fully ripe. For pot cultivation

this is a valuable variety. We have nowhere seen or heard of this variety except in the Society's Gardens. 'Lady Hastings' is another new grape, a sport from 'Muscat Hamburg,' with all the delicious flavour of its parent, but with a stronger constitution, not so fastidious as to soil and treatment as 'Muscat Hamburg,' and bearing larger bunches and berries.

THE LASTING QUALITIES OF DAHLIAS.

A Fellow writing from Wiesbaden draws attention to a point of considerable interest in connection with dahlias. He found that some varieties would, on being cut for decorative purposes, last much longer than others kept under the same conditions. Herr Emil Becker, also of Wiesbaden, states that he finds those varieties with narrower foliage possess more lasting qualities than those with broad flat leaves. He considers that plants which have been heavily manured with stable manure are less lasting than those which have been grown without its aid, and finds that if the foliage be removed immediately after the flowers have been cut they last much better in water than they do in the ordinary way. The matter is one well worthy the attention of growers and raisers of these brilliant, decorative flowers, and observations upon the subject would be welcomed.

HARDY WINTER FERNS.

A Fellow writes asking, "Are there any nice evergreen ferns I could plant along a woodland walk for winter?" There are a few, but only a few, which can be recommended for such a purpose:—

- (1) *Polystichum aculeatum*.—A most beautiful native British plant, with broad leaves like huge ostrich feathers.
- (2) *Polystichum armatum*.—A North American plant, perfectly hardy here, with leaves less divided than the preceding, less feathery, more like an ostrich plume as conventionally drawn in heraldry, but of equal beauty; indeed, in winter, with the edges of the fronds outlined with hoar frost, it is even more lovely than *P. aculeatum*.
- (3) *Polypodium vulgare*.—Another of our native ferns, very common, but none the less delightful to the eye when clustering with a mass of fronds all round the bole of a big tree, or at the base of a big bit of rock. It will grow where very many other things refuse—e.g. under a thick spruce. But being dwarf it should always be planted where it can be well seen, as close round a tree, where its rather pale green leaves make a glorious contrast with the dark brown bark of the tree's trunk.
- (4) *Scolopendrium vulgare*.—The common Hart's-tongue fern, once very common, but growing less so year by year. It asks for a heavier damper soil than the others; it will, however, live wherever (1) and (2) will grow, though its favourite haunt is the side of a damp ditch in the claylands. Its broad strap-like leaves of glossy green are very cheering in the winter woodland. It should, however, be planted in clumps of two or three plants, as, unless in a position and a soil that suits it well, it does not make big plants such as are wanted along a woodland walk.

There may be other evergreen ferns suitable for woodlands in winter, but if so we have not come across them. Of those four (1) and (2) are almost equal in beauty, and both grow into fine big plants. No. 3 should be used chiefly in conjunction with big rocks or the trunks of trees; and, except on damp heavy soils, (4) should only be used occasionally to give a little variety.

There are two others which, though not strictly speaking evergreen, will generally keep their leaves green till February or even later, and should certainly not be forgotten for the winter woodland:—

- (5) *Polystichum angulare*.—Very similar to, but with the leaflets rather more finely divided than, No (1), and lacking its shiny glazed evergreen look.
- (6) *Lastræa dilatata*.—Very desirable, and quite distinct from any of the others, and holding its leaves quite long enough to deserve a place in the winter woodland.

Fern enthusiasts would unhesitatingly recommend a number of the numberless varieties of these six, but we strongly advise our inquirer to be content at first with these; and when they have become thoroughly well established, then, if he think more diversity required, let him try some of their varieties. The craze for varieties of our native ferns may *very easily* be overdone; a very few of them, probably not more than you can tell upon your fingers, are improvements on the natural forms for outdoor growth, and some are actual monstrosities, curious no doubt, and very interesting to the student of nature's possibilities and freaks, but devoid of nature's natural beauty, and generally very difficult to grow in the woodland.

BOOK REVIEWS.

"Schlich's Manual of Forestry: Forest Utilisation." Vol. v. By Professor W. R. Fisher. 2nd edit., 8vo., 840 pp. (Bradbury, Agnew, London, 1908.) 12s. net.

This is an English translation, by Professor Fisher, of Dr. Carl Gayer's well-known work "Die Forstlienutzung," and has, possibly by permission, been included as volume v. of "Schlich's Manual of Forestry."

Although an excellent work for Continental foresters, it appeals but little to wood-managers in this country, for floating timber, the utilization of leaves and twigs, resin-tapping, and the disposal and sale of litter hardly come within the scope of British forestry. However, some of the chapters are excellent, and contain much of interest to the manager of our home woodlands, though in early editions of "Brown's Forester" similar matter, much condensed, may be found.

The chapter on "Industrial Uses of Wood" claims attention as being thoroughly practical and to the point; but, on the whole, we hardly think that the vast labour in translating the work into English was a necessity—so far, at least, as British forestry is concerned—as few of the operations are practised in our woodlands.

"Our British Trees, and How to Know Them." By Francis George Heath. 3rd edit., revised, small 8vo., 491 pp. (Routledge, London, 1908.) 5s.

No one has done more to popularize our woodland trees and shrubs than Mr. Heath. His charmingly written book "Our British Trees," the third edition of which has just been published, is at once not only in a popular, but in a scientific sense as well, one of the most valuable contributions to the subject that has yet appeared.

With the aid of the text—which, by the way, is quite devoid of unnecessary technicalities—assisted by 250 carefully executed illustrations, the student should have little difficulty in recognizing any of our woodland trees or shrubs. The book, too, is of a most convenient size for reference purposes, is well got up and cheap, while it is wonderful what Mr. Heath has crammed into some 500 pages.

We can strongly recommend this book to every student of our British trees.

"The Cell as the Unit of Life: an Introduction to Biology." By the late Dr. Allan MacFadyen. Edited by Dr. R. Tanner Hewlett. 8vo., 881 pp. (Churchill, London, 1908.) 7s. 6d. net.

This volume, which should prove very valuable to students, contains five lectures on "The Cell as the Unit of Life," six on "Cellular Physiology," three on "Recent Methods and Results in Biological

Inquiry," and four on "Toxins and Antitoxins"; concluding with "The Effects of Physical Agents on Bacterial Life," a glossary, a list of publications, and an index. The lectures were all delivered at the Royal Institution, where the author was the Fullerian Professor.

It would be useless to attempt to give even a summary of the contents. Every lecture is replete with matter compressed into a small compass, yet clearly expressed. Commencing with the description and vital phenomena of the cell, the reader is carried on to a consideration of the tissues; protoplasmic response to stimuli is treated at length, and the ferments or enzymes are discussed; a brief, but terse, account of bacteria and ptomaines, and diseases caused by them, is also given.

We cannot speak too highly of the book, which must be in the hands of every student whose duty it is to know all he can of the subject.

"The Young Botanist." By W. P. Westell and C. S. Cooper; with coloured and uncoloured illustrations by C. F. Newall. 8vo., 199 pp. (Methuen, London, 1908.) 3s. 6d. net.

"The purpose of this little book is to serve as a guide to the young botanist in the identification of the more familiar wild flowers" (Preface).

It commences with hints for the young botanist, there are instructions as to how, where, what, and when to collect, and so on. The principles of classification, with a description of classes, orders, &c., follow. Leaves in inflorescences, pollination and fertilization, and fruits are discussed.

We note the authors have a section on "Contrivances to prevent self-pollination." As any *intention* is a subjective inference only, it would have been better to have said "contrivances which hinder self-fertilization."

As Müller observes, there are countless ways in which plants usually crossed revert to self-fertilization when neglected by insects; it seems more probable that they, by becoming adapted to insects, become inadapted to self-pollination.

In the "Description of Natural Orders and Species" only a selection of the latter is made. A brief description, giving just the most prominent facts, is provided for each, but they are not all figured. The illustrations are neat and pretty, but very rarely are any details of the floral structures given. These would have greatly assisted the young botanist, especially if a diagram of the flower had been added.

"Old West Surrey: Some Notes and Memories." By Gertrude Jekyll. 8vo., 320 pp.; illustrated. (Longmans, London, 1904.) 18s. net.

Though it seems rather "late in the day" to review such a deservedly well-known book as Miss Jekyll's "Old West Surrey," these remarks may meet the eye of some who have not read the book and who may be induced to do so. Notwithstanding that the old cottages, their occupants and contents, are more fully described than the gardens and the plants which grow in them, there is a delightful chapter on cottage gardens, illustrated by a dozen excellent photographs. The book is a most valuable and interesting record of the life which the cottagers lived in the early and

middle parts of the last century—a life, however, which did not differ much from that led by the labouring classes in the other parts of the south of England, one which is now rapidly changing, and which in the course of a few years will not be remembered personally by anyone. Many old cottages and their contents are figured; they, of course, were in existence years before the dawn of the nineteenth century. Some of the views of the former are most charming; they were all photographed by the authoress, who has evidently a keen eye for the beautiful in other things besides flowers and gardens. The old furniture, vessels, and other household implements, china ornaments, samplers, &c., are all given; none is forgotten. The portraits of the inhabitants are very good, showing the dress of the period both of men and women. What a pity it is that the smock-frock—a most useful, becoming, and cheap article of dress—is so seldom seen now! A copy is given of an amusing autobiography, written by an old woman, and a photograph of the writer. Altogether this is a fascinating book, and should be very instructive to the rising generation who, accustomed to gas, electric light, &c., know nothing about rushlights, snuffers, and many other household gods of the same period.

“*Timber: a Comprehensive Study of Wood in all its Aspects, Commercial and Botanical.*” Translated from the French of Paul Charpentier by Joseph Kennell. 8vo., 437 pp. (Scott, Greenwood, London, 1902.) 12s. 6d. net.

This is a useful work, though much of the information is more applicable to foreign than to home forestry. The qualities of the various timbers reported on, and uses to which they are applied, form an interesting and instructive chapter, and point out in what a variety of ways the wood of various trees can be profitably utilized. The amount of damage caused to woods by insect and fungus pests is rather, we think, underrated, while the descriptions of injurious forest insects is meagre in the extreme. Timber-merchants and fencers will read with interest and profit the chapter on preserving timber, and the various tables of the weights of wood previous to and after treatment are both concise and valuable. The application of wood to the art of dyeing, and dyeing and staining wood, hardly appeal to the British consumers of wood; but accessory products, in the matter of bark for tanning purposes, is a chapter that will well repay perusal.

“*Wayside and Woodland Ferns: a Pocket Guide to the British Ferns, Horsetails, and Club-Mosses.*” By Edward Step, F.L.S. Small 8vo., 187 pp. (Warne, London, 1908.) 6s. net.

As a compact and well-illustrated pocket guide for the student of our native ferns and their allies this little book of some 140 pages and an equal number of interleaved plates—photographic, coloured and plain—can be highly recommended. The illustrations are capitally executed, though some of the photographs lack sharpness of definition. The descriptions of the species and their habitats are clear, full, and correct, and their determination when found should therefore be easy to the student. The author purposely confines himself to the normal forms,

referring students of varietal ones to special books in that line, and we cordially sympathize with him in the hope that his contribution to normal fern lore will not tend in any way to stimulate that vandalism—pseudo-scientific and other—which has done so much to denude our fern districts of their charming occupants. On the other hand we are bound to take exception to such remarks as those on p. 47: “The varieties of the lady fern that have arisen *under cultivation* are legion, and many of them have been so *crossed* and *modelled* by fern-growers that they no longer present any likeness to the natural types. They are more admired by certain persons on that account, but we are of opinion that the native grace of the wild fern is superior to *all the cultivated mongrels and monstrosities.*”

The italics are ours, and indicate a lamentable ignorance of the facts that the great majority of these varieties have *not* arisen under cultivation at all, but are purely natural wild sports, in many cases of greatly enhanced beauty by virtue of their greater development of the natural normal charm; that crossing has had next to nothing to do with the matter, so that mongrels do not exist (in this species at any rate); that the term “monstrosity,” as applied to the beautiful plumose forms of this species, is simply a relic of long-exploded ideas on the varietal connection; and, finally, that man can do absolutely nothing in the way of “modelling” a new type, but can only prize it when it spontaneously appears. Despite our admiration for Mr. Step’s book as a whole, we cannot refrain from this protest, as such remarks are characteristic of all books of this class produced by non-students of the varietal side of the subject. We also note with regret that *Blechnum spicans*, the hard fern, is named *Lomaria*, although two clear illustrations on Plates IV. and XXVI. show the accepted distinguishing fructification of *Blechnum* by the spores *not* forming a fringe (Greek, *loma*) to the pinnæ as in *Lomaria* proper, since the sori are well within the margin and separated from it by an indusium which in *Lomaria* is formed by the margin itself. This is another example of errors handed on from one book to another, and in this case *Blechnum* is not even mentioned as a synonym anywhere in the book. With regard to the shield ferns, *Polystichum angulare* has been found in Perthshire—i.e. north of the Clyde—and it is incorrect to state that *P. aculeatum* gradually merges into *P. angulare* as we come farther south, for both may be found in their distinctive forms side by side in Devon and other southern counties.

“*Sylva*; or, a Discourse of Forest Trees.” By John Evelyn, F.R.S. With an Essay on the Life and Works of the Author, by John Nisbet, D.Ec. A reprint of the 4th edition, in 2 vols. 8vo., 885 pp. + 287 pp. (Doubleday, London, 1908.) 21s. net.

Concise, yet full of detail, will be found the interesting introduction by Dr. Nisbet to the new reprint of the fourth edition of “*Evelyn’s Sylva.*” The masterly Life of John Evelyn, which extends to seventy-two pages, is divided into eight chapters, every one of which bristles with interesting information regarding the doings of one whose writings have had a vast influence on British arboriculture. Of the original work it is unnecessary to make a comment, its value being well known

and justly appreciated by everyone who takes an interest in matters pertaining to our forest trees. We think it was wise to leave severely alone the original work, with its characteristically quaint style of dealing with our forest trees, the descriptions and uses to which the timbers are applied appealing as truly to us to-day as they did when the great work appeared fully two and a half centuries ago. We certainly feel that Dr. Nisbet has done his part of the work well, and we are only sorry that the price will be the most serious drawback to its general use.

"The Book of Garden Pests." By R. Hooper Pearson, F.R.H.S. 8vo., 214 pp. (John Lane, London, 1908.) 2s. 6d. net.

The position Mr. Hooper Pearson holds as assistant editor of the "Gardeners' Chronicle" has given him a unique opportunity of becoming acquainted with the particular diseases and pests which most do trouble the gardener; and he has dipped freely into the pages of the magazine with which he is connected, and into such books as Miss Ormerod's "Handbook of Injurious Insects," Dr. Cooke's "Fungoid Pests," and Mr. Massee's "Text-Book of Plant Diseases," and extracted therefrom the most approved methods of dealing with these pests. The gardener who is too busy to study from a more exact standpoint the fungi and insects which meet him at every turn, will find here an excellent account of the symptoms by which he may recognize the more commonly occurring attacks upon plants and the best means of getting the better of them; and this is precisely the kind of thing most gardeners require. Many of the pests are illustrated in a manner calculated to make their appearance clear and to show the main points in their life-histories.

"First Course in Biology." By L. H. Bailey and W. M. Coleman. 8vo., 592 pp. (The Macmillan Co., New York, 1908.) 7s. 6d.

The tendency in American secondary schools "is away from the formal technical completion of separate subjects and toward the developing of a workable training in the activities that relate the pupil to his own life." The tendency is shown only to a slight extent in secondary schools in England at the present time; but there are signs that the revolt against the method of teaching adopted, and wisely adopted, in the university is beginning, and a method more in keeping with the calibre and requirements of the children to be educated is taking its place. The revolt has gone farther in the elementary schools, where the Nature-study method has in many cases been adopted with excellent results where it has been recognized that Nature-study is a method of education and not a subject for instruction. The present volume is an effort to meet the need of those schools where it is felt that "the ideals and abilities should be developed out of the common surroundings and affairs of life, rather than imposed on the pupil as a matter of abstract, unrelated theory." The first part of the book deals with plants (204 pp.), and is written by Professor Bailey; the second (224 pp.) is concerned with animal biology; and the third (164 pp.) with human biology, these parts being written by Mr. W. M. Coleman. Like all the books with which Professor Bailey has to do, we have here one where the spirit of

the true teacher breathes in every page. The parts dealing with plant biology and human biology are particularly good; and the second part is good, but impresses one with the feeling that general animal biology is a less natural subject of instruction than either of the other two. A great deal of dependence is placed upon the figures (which, by the way, are excellent all through the book) in this part, thus introducing a factor of possible inaccuracy in the premises, which is absent when actual specimens are available, and it is obviously impossible to have living specimens of animals, from the sponge to the big cats and monkeys, available for examination. The methods of instruction here are, as all through the book, very suggestive, and the authors are to be congratulated on having produced a book which is bound to have an inspiring effect upon those teachers and scholars into whose hands it shall come.

"A Text-book of Botany." By J. M. Lowson. Fourth edition. 8vo., 581 pp. (Clive, London, 1908.) 6s. 6d.

"Elementary Botany." By Percy Groom. Eighth edition. 8vo., 272 pp. (Bell, London, 1908.) 8s. 6d.

If the numerous elementary books on botany which have issued from the press since Oliver's "Lessons" appeared in the 'sixties and Henslow's "Botany for Beginners" in the 'seventies be any criterion, botany as a school or examination subject is still well to the fore. The majority deal purely with structure, external and internal, and the principles of physiology. In both of the books under review this is well done and well illustrated. Until the last quarter of a century classification was the goal aimed at, for the details of structure were only studied as marks of distinction whereby to classify plants.

Darwin first drew attention to the *uses* of structural details for the requirements of the plant itself. His many works, such as "The Fertilisation of Orchids," "Climbing Plants," &c., introduced what is now called ecology, *i.e.* the study of plant structure and physiology with special reference to the habits of the organism when growing wild.

This should be the aim and goal of all students of both kingdoms of living beings. Text-books should be so framed as to lead up to this end; none can be considered up to date unless the principles of ecology are clearly, if succinctly, stated, so that the student is soon awakened to its interest and importance, and can himself pursue it in the field.

Turning to the index, we find Mr. Lowson's book has fourteen references to "adaptation," the basis of ecology; the new ecological terms, edaphic, hydrophytes, mesophytes, and xerophytes, with twelve references, &c., are given. These show that the author is alive to the importance of the subject. In Mr. Groom's book, with the exception of some adaptations in roots and leaves, none of the above words find a place in the index. Mr. Lowson gives excellent though brief accounts of ecological associations, and on field observations upon them. This only occupying little more than a page, might have been lengthened by calling the attention of the student to normal amphibious plants and the frequent "experiments" which Nature makes with plants when they happen to grow in unaccustomed conditions. Thus, if a pond dries up,

the water crowfoot grows just as well, if not better, in the mud, but with its stem and leaves in the air, *now* perfectly adapted to an aerial existence. On the other hand, many xerophytes find their way into marshes, &c., and change accordingly in a reverse way. The student should look out for these interesting cases, for they point the way to evolution itself.

"Parallel Paths: a Study in Biology, Ethics, and Art." By T. W. Rolleston. 8vo., 299 pp. (Duckworth, London, 1908). 5s. net.

This book contains three parts. Part I. deals with the Argument from Design, the Wheel of Life, *De minimis*, the Darwin-Lamarck, the Darwin-Weismann, and the Directive Theory of Evolution. Part II. discusses Law, Free Will, Personality, the Ethical Criterion and Sanction. Part III. is on Art and Life. There are also four appendices and an index.

The author gives a good account of Paley's argument and of Darwin's and Weismann's position, showing clearly wherein they fail to account for the *cause* of the origins of structure. He calls attention to the invariable presence of "purpose," or, "as I should prefer to call it, *directivity*." He does not add that this word is new to science—having been invented by Professor A. H. Church, F.R.S.* Subsequently he has a chapter on "Law and Directivity." This must be distinguished from "force," for no force is self-directing. This is where Weismann fails, for he says: "Life is merely a chemico-physical phenomenon." It is more than force, for it is the *director* of all the forces in a living body.

The author is not quite correct in saying: "The variations on which natural selection has to work are produced, according to Darwin, not only by the exercise of particular organs, as in Lamarck's theory, but also and more potently by "innate variations originating from unascertained causes in the reproductive cells." The latter is Weismann's position; but Darwin, in his "Animals and Plants under Domestication,"† says it is "changed conditions of life" in response to which "indefinite or definite variations arise." Unfortunately for natural selection no indefinite variations—*i.e.* a mixture of adaptive and inadaptive variations—have ever been seen; *all* the individuals of seedlings or animals grow in direct adaptation—*i.e.* "definitely."

The author says: "Stimulus and response, taken together, constitute the directive force in obedience to which the world unfolds itself in the evolutionary process." But no force can be "directive;" it is *directed*, and by life. A man fires at a target; the bullet hits it, not by any "directive force," but by means of a force *directed* by the man.

Another expression is very far from being correct: "Crystallization is a process which trembles on the very verge of vital action." A crystal can increase in size by superficial accretions of a like nature; but a living being grows by internal development. There is nothing in common between them.

* See "Directivity," an article in the *Hibbert Journal*, October 1907.

† Vol. ii. p. 271.

Part II., on "Ethics," is rather out of place for discussion in a horticultural journal; so we will leave it for the reader. Though some few points have been alluded to, it must not be supposed that they sample the book, which is very readable, and full of important matters under the headings given above.

"The Bible of Nature." By J. A. Thomson, M.A. 8vo., 248 pp. (T. & T. Clark, Edinburgh, 1908.) 4s. 6d. net.

This little book consists of five lectures delivered at Lake Forest College. Their subjects are: "The Wonder of the World," "History of Things," "Organisms and their Origin," "The Evolution of Organisms," and "Man's Place in Nature." They are very interesting, and written in an easy, popular style which all can follow, though the title "The Bible of Nature" does not appear to us a very happy one. Speaking of the universality of "adaptations," which indicate progress, the author does not allude to innumerable "degradations" wherever Nature finds no further use of structures while readapting organisms to new conditions. Thus submerged aquatic plants are in perfect adaptation to water, though this has the effect of causing a general degeneracy throughout the entire organism.

Science brings induction and experiment to bear upon objects of observation, but stops short of any inquiry into their primary cause; the author might have added that the "proof" of an Almighty Mind is based on precisely similar lines of induction, or the accumulation of probabilities. "A 'First Cause' is taken for granted," but the evidence of "intelligence" in that First Cause is equally obvious on scientific reasoning. After giving a succinct account of "organisms and their origin," evolution is dealt with. It is said that evolution issues from "variability" subjected to the "directive factors of selection and isolation"; but the author does not describe Darwin's use of natural selection aright, for it has no selective power whatever. "'Of fifty seeds she often brings but one to bear.' The relatively fittest tend to survive and to reproduce, handing on their advantages to their progeny." But Darwin's reason of the survival of *one* or a *few* is that all the rest develop in themselves "injurious"—that is, "inadaptive structures," and consequently they *must* die.* This was a pure surmise, for Nature never makes such injurious characters. The real reason why so few live is a matter of accident. Other plants will not let them grow; or they get devoured, &c. It is mainly what Darwin called "fortuitous" destruction.

The volume concludes with a long chapter on "Man's Place in Nature." He gives a succinct account of man's relationship with animals, and alludes to the difficulty of the problem of the ascent of man, who took "probably 300,000 years" to make. "He probably arose by a mutation, *i.e.* by a discontinuous variation of considerable magnitude." The late Dr. Carpenter observed that the diminution of the jaw and teeth (used by apes for attack and defence), with the corresponding reduction of the temporal muscles, allowed the skull to enlarge and the brain to develop. But this implies an *absence* of a

* *Origin of Species*, &c., p. 80, 1st ed.; p. 63, 6th ed.

struggle for existence with other animals. Had it continued, man could never have arisen, as the head would have remained ape-like; whereas, with the development of the human brain, man acquired the power of making an *abstraction* an object of thought. Such (as Locke maintained) is the fundamental difference between man and animals.

The reader will find an abundance of interesting and instructive matter, though he may not accept every point of the arguments.

"Memories of My Life." By Francis Galton, F.R.S. 8vo., 389 pp. (Methuen, London, 1908.) 10s. 6d. net.

Not only the scientific reader, but all who are interested in travels and experiences in unexplored regions, and studies of human nature, will find this book intensely interesting. Dr. Galton takes us pleasantly through his boyhood, in which we see how "the child was father of the man." Then, too, he discusses medical theories, being much indebted to Sir D. Bowman, the oculist, whom he accompanied to Vienna, where he visited a lunatic asylum, and where, much to his horror, one suddenly embraced him as her "long-lost Fritz"!

His passion for travelling seized him in 1840; so while studying under Liebig he took a tour in the East, but was back at Cambridge by the October term. He describes his life there, and gives accounts of many friends and Dons. He amusingly refers to Dr. Whewell paying court to the lady who became his first wife, as his behaviour reminded him of a turkey-cock similarly engaged. But the author does not often indulge in comical descriptions.

Egypt and the Soudan were the next countries visited, when Mehemet Ali was ruler and Shepheard's Hotel looked out upon rice-fields.

His next journey was to Damaraland, in South-West Africa, where many adventures are described. On his return he married the daughter of the Very Rev. G. Butler, Dean of Peterborough.

Art, travel, social life, geography, East Africa, and other subjects are admirably dealt with, and the chapters are full of information and interest. It may be mentioned that Galton had much to do with starting the meteorological observations now published daily in the *Times*, &c. The last five chapters give succinct accounts of his scientific pursuits, and deal with anthropometric laboratories, composite portraits, human faculty, heredity and race improvement. The reader will thus see that the work covers a large field, both autobiographic and scientific; and few will put it down without reading every page.

"The New Flora of the Volcanic Island of Krakatoa." By A. Ernst, Ph.D. Translated by A. C. Seward, F.R.S. With two sketch-maps and thirteen photographs. 8vo., 74 pp. (Cambridge University Press, 1908.) 4s. net.

This work deals with visits paid to the island in 1886, 1897, and 1906. After describing the vegetation of the coral island of Edam, near Batavia, and other places the vessel stopped at, the flora of Krakatoa is dealt with. The flora of Krakatoa now includes representatives of all divisions of the plant kingdom. The total number of species has reached 187. A tabulated list is given; the majority are phanerogams, forming incipient associations

on the strand, plains and mountain slopes. Two-thirds of the first are species ubiquitous on tropical coasts. There are sixty-seven in all, thirty-five being widely spread and abundant beyond the Malay Archipelago, and many occur over the whole tropical zone. On the gently sloping beach and on the sides of the mountain-cone there are forty-two, also being of wide distribution.

An interesting chapter is given on the biological conditions on Krakatoa. Every trace of the former vegetation had disappeared, and the present flora is attributable to—ocean currents 60 per cent., wind 32 per cent., and fruit-eating animals 7·5 per cent. Lizards, birds, gnats, wasps, and red and black ants have also established themselves. The first organisms were dark-green gelatinous layers of “blue-green” algae, which were found on the surface of the pumice and ash. These were regarded by Treub as affording a satisfactory nutritive medium for the germination of the spores of cryptogams and the seeds of phanerogams.

The question as to the necessary food for the plants, and the source of nitrogen especially, is discussed, as well as the relative importance of the different agents of plant dispersal in the colonization of the Krakatoa islands.

The work is a valuable contribution to the origin of a flora and its ecological developments.

“Handbook of Practical Botany, for the Botanical Laboratory and Private Student.” By Dr. E. Strasburger. Translated by W. Hillhouse, M.A., &c. Sixth Edition revised. 8vo., 527 pp. (Swan Sonnenschein, London, 1908.) 10s. 6d.

We need scarcely say more than that this well-known book has been brought thoroughly up to date. It is entirely devoted to microscopic anatomy, and carries the student through the most characteristic features of the leading groups of plants. Beginning with easy lessons, as that on starch, he is led to karyokinesis of the nucleus, and shown how to examine with reagents and all that is necessary. No student who has the time required at his disposal could well do without the valuable aid afforded by this excellent manual.

“Systematic Anatomy of the Dicotyledons.” By Dr. Hans Solereder. Translated by L. A. Boodle, F.L.S., and F. E. Fritsch, D.Sc., F.L.S., revised by D. H. Scott, M.A., F.R.S. Two vols. 4to., 1188 pp. (Clarendon Press, Oxford, 1908.) 24s. net each volume.

Apart from the interest which the minute anatomy of plants intrinsically possesses for the serious student, its value as an aid to the determination of the natural relationships of plants has been demonstrated by means of the active research with which it has been pursued during the past few years, and it is of great importance as an assistance in other lines of botanical investigation, both scientific and applied. The English-speaking botanist therefore owes a great debt of gratitude to the author who has amassed, and to the translators who have made more readily available, the vast amount of information hitherto scattered through the pages of often inaccessible books and pamphlets. The original edition of

the work was published in German as long ago as 1898, but the subject-matter has been brought thoroughly up to date in an appendix of 218 pages, and the "Schlussbemerkungen" of the German edition have been revised and extended in the "Concluding Remarks" (pp. 1070-1168), where a very full review of those anatomical characters which have proved to be of taxonomic value is given. The general plan of the work is to deal with each of the Dicotyledonous families in turn, and to pass in review the anatomical features which characterize it, and then to deal with the structure of the leaf and stem in detail. At the conclusion of each section a list of the works relating to the family is given. The completeness and comprehensiveness of such a mass of minute detail can, of course, only be tested by the continued use of the book. Its translation has sometimes involved the difficulty of finding a term which will accurately convey the author's meaning, but this difficulty has, to a large extent, been met by the making of a glossary, which also serves as a partial index. It is a pity that a fuller index could not have been given, as it would have rendered the book much more easy to consult. One hundred and eighty-nine figures illustrate the text, and the print and paper as usual leave nothing to be desired.

"The Origin of a Land Flora." By Professor F. O. Bower, F.R.S. 8vo., 727 pp. (Macmillan, London, 1908.) 18s. net.

The learned author has for many years applied himself to the close study of those groups of plants, the mosses and ferns and their allies, which appear to come between the primitive algae and the highly complex seed-bearing plants of to-day. In the present volume he has brought together the facts he has accumulated, and the discoveries of other investigators in the same group, and reviewed them in the light of our present knowledge of the sequence of evolution among plants as revealed in the rocks, with the object of formulating a theory of the origin of the habit which all the higher plants have acquired of living on the land. He has produced a work full of details, marshalled, arranged and discussed with all that philosophical acumen which we have learned to look for in the works of the German botanist, and but rarely in those of any other nation.

The title of the book might lead one to suppose that here was one suitable for the general reader, but the sub-title, "A Theory based upon the Facts of Alternation," would prepare him for an abstruse discussion. Indeed, only the specialist could hope to follow many of the arguments brought forward from so many lines of research, all, the author considers, pointing to the conclusion that the land flora had its origin in "a phase interpolated between the events of chromosome-doubling and chromosome-reduction in the primitive life-cycle of plants of aquatic habit."

"The final goal of all organic development is the establishment of new individuals," and if the land flora had its origin in this way, and development followed the lines sketched by Professor Bower, then it is intensely interesting to see how that in the earlier forms of land plants (some of which have persisted, in a modified form perhaps, to the present day) when the *method* of ensuring the production of adaptable individuals and their establishment was not greatly specialized, this deficiency was

made up by the prodigious numbers of spores which were produced, and which were so small and light that they could be carried great distances, as we see in the mosses of to-day. This great number was further ensured by the high development to which the spore-producing part attained in the ferns, and then came specialization, and later still the heterosporous types, and especially the seed-plants. In these, individual precision has made up for numbers, and the natural result has been that the reproductive system has been reduced to quite small proportions. The publisher's work calls for nothing but praise, and the abundant use of good figures increases the value of the book in a marked degree. A good index is given.

"British Oak Galls." By E. T. Connold, F.Z.S., F.E.S. 8vo., 169 pp., 68 plates, 17 figs. in text. (Adlard, London, 1908.) 10s. 6d. net.

Mr. Connold in the preface to his previous work on "British Vegetable Galls," published in 1901, says, "No illustrations are given of Oak galls; they will probably appear subsequently in a volume devoted exclusively to Oak galls." This volume has now been published, and is a welcome addition to the literature dealing with the galls of the Oak. It can hardly be considered a companion work to the other volume, as it is of a different size (octavo instead of quarto), and is printed on the very objectionable heavily-clayed paper which is unfortunately now so frequently used when half-tone figures are inserted in the text; but in the present instance the figures in the letterpress would have come out very well on ordinary paper. The half-tone plates of course require a very smooth paper. In the preface the author mentions that there are fifty-four species of *Cynipidae* which produce galls on the Oak. This is hardly correct, for some twenty-six of these so-called species are merely the alternate generations of other species, which reduces the number of true species to twenty-eight. We cannot compliment the author on the arrangement of the work. It surely would have been more convenient if, in the description of the insects, that of the agamic generation had followed that of the sexual one, but we find *Andricus cirratus* described on p. 53 and the galls figured on plate xiv.; and the agamic generation *Aphilothrix callidoma* on p. 77 and plate xviii.; *Teras terminalis* on p. 137, and plates lvi. and lvii., while the alternate generation *Biorhiza aptera* is on p. 98 and plate xxxi. This muddle is due to the genera being arranged alphabetically. It is mentioned in the introduction that "For several reasons it has been found desirable to arrange the species in alphabetical order. In departing from the classification set forth in my other work, 'British Vegetable Galls,' I have been animated with the desire to present the subject in as simple a form as possible."

The classification in the work alluded to had this virtue: all the galls on the stems, leaves, &c. being placed together under the part of the plant that they were found on, on finding a gall on a leaf one had only to look among the galls formed on leaves to find a description and figure of it. But in the present arrangement, unless you know the name of the gall, which you probably do not if you have never seen it before,

you do not know where to look. The present classification is therefore neither scientific nor popular.

No mention is made of the usual classification of the makers of the galls, nor is any figure given of even one species. This is a great omission in a work of this description. Both in Cameron's "Phytophagous Hymenoptera" and Stratton's translation of Adler's monograph of "Alternating Generations in Oak Gall Flies," which up to the present time have been the most accessible works on Oak galls, the galls are classified under the names of the insects which emerge from them, and are arranged according to their natural affinities, which is very much better and more convenient. In a popular book, a list of the galls arranged under the heading of the part of the plant on which they may be found should also be given.

In quoting various authors as to the meaning of the word "cambium" (the layer of tissue in the plant in which the gall flies deposit their eggs), the definition given in Dr. B. Daydon Jackson's recent "Glossary of Botanic Terms" is omitted, though it is one of the best, namely "A layer of nascent tissue between the wood and the bast adding elements to both."

Chapter 5 is devoted to a very interesting account of the British Oak, the Turkey Oak, and the Evergreen Oak. In chapter 6, hints are given on collecting and mounting Oak galls, and the implements required are enumerated. A pair of sharp nippers, a figure of which is given, is said to be essential, but we should have thought that a pair of scissors with one curved blunt blade and one sharp one, such as are so frequently used in gardens, or one of the pruning implements generally known as "sécateurs," would prove much more convenient for the purpose than the wire cutters used by the author. A white cloth would in many cases prove more useful than a sheet of paper; it would not tear or blow away so easily. There is a clerical error on p. 43, the word "blur" is used instead of "burr." The descriptions of the galls are given in a very clear and concise manner in a synoptical table in every case.

Three galls (if they can be considered galls) are described and figured which are not formed by members of the family *Cynipidae*. One of the *Coccidae* or scale insects forms slight pits in which it lives on the Oak shoot, but it is not the cause of more than a very slight swelling of the shoot, and the insect is not hidden in the stem, so there is nothing that can really be called a gall.

The grubs of one of the "gall-gnats" cause the lobes of the leaves to fold over them, and under this protection the grubs live and feed, but there is no gall.

The third gall is caused by a fungus, *Dichaena quercina*, which infests the stems, branches, and even twigs, causing smooth rounded swellings on the bark, and on a longitudinal section being made it is found that the wood to some depth is implicated. It is very questionable if the tumours on the oak stem (see plates lxxvii. and lxxviii.) are caused by this fungus. Similar excrescences are very common on the stems of other trees whose branches and shoots do not show any signs of being attacked by this parasite.

The plates are as a rule very good; that showing sections of the stem of an oak would have been more interesting had a diagram been

given showing in what direction through the stem the sections were taken. The insets, where they occur, detract very much from the appearance of the plate, and many of the plates are too crowded with objects; for instance in plate vi. had a few of the leaves only been figured by themselves it would have been much easier to have realized the form of the galls which at present are very indistinct; the male catkins shown on plates xiii., xvi. and xxiv. should have been reproduced on a much larger scale, so that the galls would have been more distinct. The four plates showing galls of *Cynips Kollari* are very interesting, though perhaps of little scientific value. Plates xvi. to xlix. are particularly good but lii., liii. and liv. are by no means satisfactory. The descriptions of the galls are followed by a useful list of 184 parasites and inquillines, which have been mentioned in the volume, a table of the months in which the galls may be found, an annotated list of the mid-European Oak galls and an index. Notwithstanding its deficiencies, we can heartily commend this book to any one who is collecting galls, as the plates will greatly help him in identifying those he may find.

"The Fern World." By Francis George Heath. Eleventh Edition. 8vo., 399 pp. (Routledge, London, 1908.) 7s. 6d. net.

This book is admirably got up, with 12 coloured plates, and a few minor illustrations depicting the normal forms of our native Ferns, while the letterpress describes them fully and gives some of their habitats in these islands and the countries abroad in which they are also indigenous. Allusions are also made to the several thousand species of Ferns existent in the world, but with all this the material is too scanty to justify the comprehensive title, more especially since, in the author's previous book "The Fern Paradise," he practically exhausted the ground as regards our native Ferns themselves, and thus adds nothing practical in this volume to the contents of its predecessor. It is also obvious that Mr. Heath has devoted but little study to recent literature on the subject, or to the real life history of the plants he treats of. Otherwise he could not possibly have written on pp. 9 and 10, in connection with the peculiar mode of reproduction of Ferns from the spore, that "when the prothallus is perfected the frond-bud," by which he clearly means the embedded embryo at the base of the archegonium, "emerges from its cell and is fertilized by the spermatozoid (? antherozoid)." He then proceeds to say that "soon after this process is completed the spermatozooids lose their activity and finally disappear. The prothallus too commences to decay, and finally with its little system of cells, it dies, leaving in its place only the fertilized frond bud, which, however, at this stage has no defined likeness to the future and complete frond. The under portion of the frond-bud lying next the damp soil soon, however, begins to form the rootstock, which subsequently gives rise to the rootlets, while from its upper portion proceeds the stalk."

As against this, every fern raiser is aware that so far from the prothallus dying, as described, prior to the appearance of the young Fern, it persists and acts the part of foster mother, so to speak, until the young plant is well rooted. The emergence of the frond-bud for fertilization is equally absurd; it lies deeply embedded in the substance of the prothallus,

and becomes fertilized by an antherozoid traversing the tube formed above it as part of the archegonium. We can forgive Mr. Heath for trying to simplify description, but not for such fundamentally misleading details as these. He also advises the spore sower that his cultures "must be kept in a dark place," whereas the more light, other than direct sunlight, the better.

We also regret to note that, in this book as elsewhere, Mr. Heath practically advocates that vandalism which has done so much to denude our ferny districts of their beauty, and which of late has happily been restricted to a great extent by punishment of the raiders. No other possible construction can be put upon advice that "the Fern hunter should be provided with a fork, stout chisel, hammer, trowel and spade, *together with a conveyance, whenever Fern hunting on a large scale is indulged in*" (the italics are ours) (p. 96). The puzzle here is how can any professed Fern lover advocate their destruction in this manner, and ignore the rights of local ownership, which are thereby outraged.

Finally the depreciatory allusions to the varietal forms of these Ferns are entirely out of date. That long names are given them is no argument against their beauty. He lumps them all as "in reality but monstrosities of a more or less constant and pronounced kind" (p. 174-5), and elsewhere (p. 195) he asserts that "varieties to a large extent are merely accidental departures from the normal form, and frequently do not preserve their peculiarities under cultivation." This last assertion is a fair proof that Mr. Heath is lamentably ignorant of the real facts, and should have studied the subject before committing himself to such a statement. The book in short is a pretty book for the table, but for the real Fern student contains absolutely nothing new.

"The Perpetual Flowering Carnation." By Montague C. Allwood. 8vo., 191 pp. (Hugh Low, Bush Hill Park, London, 1907.) 2s.

The book treats of this type of Carnation in considerable detail, and the author starts by defining "*Dianthus Caryophyllus* more commonly known as Pink." This is misleading, as the garden Pink has been derived from *D. plumarius*, although to be fair to the author *D. Caryophyllus* is also known as the Clove Pink. After giving some account of the introduction of the tree Carnation from France to America in 1844 and its subsequent improvement there, it is also stated that "there is not the slightest doubt but that the British tree Carnation was originally imported from France about 1856." Certainly six years earlier, to the writer's knowledge. He remembers training some of them to walls in Scotland in 1852-8, but both plants and flowers were contemptible in comparison with the beautiful flakes and bizzarres grown at that time.

A very useful introduction from France in the early sixties was 'L'Alégatière'; it had fairly well formed flowers of a bright scarlet colour. Our author states that this variety "was grown extensively about 1865 to produce cut bloom for Covent Garden Market, and old Carnation growers have told the writer that these were grown on the roofs of houses, not being allowed to bloom for the first two years." Verily there were some queer florists somewhere in those early days. The writer bought it when it was first sent out, and flowered it at once in the greenhouse. Why it

was not allowed to bloom for two years, and why it should be placed on the roofs of houses, he cannot imagine.

Propagation and after treatment are very fully detailed. The author is a practical gardener, and his practical instructions are to be depended upon. One remark is well worth careful consideration. It is stated that "some growers think that by keeping their houses closed during cold weather they save fuel, which indeed they do at the expense of the plants." No good gardeners would treat their plants in this way, as the blooms would damp off, and the plants would become unhealthy. The only way to obtain good Carnation blooms in winter is to maintain a rather dry atmosphere from the moderate heat of the hot-water pipes, and ventilate sufficiently to allow the moisture to escape; a minimum temperature of 55 degrees is necessary. All details of culture are given; the best form of house in which to grow the plants, and diseases and insect pests are treated as they deserve. There is a useful calendar of operations for every month in the year, and the author finishes with a truism, "Whatever you do in growing Carnations do it thoroughly, otherwise do not expect to succeed."

"The Commercial Products of India," being an abridgment of the "Dictionary of Economic Products of India." By Sir George Watt, C.I.E., M.B., C.M., LL.D (Abd. and Glasg.), F.L.S., &c. Published under the authority of His Majesty's Secretary of State for India in Council. 8vo., viii + 1189 pp. (Murray, London, 1908). 16s. net.

The "Dictionary of the Economic Products of India" has, since its publication in 1885-94, been the standard work of reference on all matters pertaining to the animal, vegetable, and mineral products of India. It is a large work, comprising six bulky volumes, and is now out of print. The work under review, as its sub-title states, is an abridgment of the "Dictionary," corrected and brought up to date; it is published in one volume, and is confined to products which are of present or prospective commercial importance.

To prepare a definite plan for compiling the work and to make recommendations on points of detail not provided for in the instructions given by the Indian Government an Advisory Committee was formed to assist the author. This Committee consisted of Sir William T. Thiselton-Dyer, K.C.M.G., C.I.E., F.R.S., then Director of the Royal Botanic Gardens, Kew, Mr. J. S. Gamble, C.I.E., F.R.S., Wyndham R. Dunstan, F.R.S., LL.D., Director of the Imperial Institute, Sir Thomas Holderness, K.C.S.I., and Lieut.-Colonel D. Prain, the present Director of Kew. The reputation of Sir George Watt as the best-informed writer on the subject of which the book treats, and the high standing of the members of the advisory committee, are guarantees of the thoroughness with which the work has been carried out; moreover the assistance of specialists is acknowledged by the author in dealing with such subjects as "Metals and Minerals," "Live Stock," "Tea," "Indigo," "Pepper," "Drugs," Agricultural Chemistry, and the classical and vernacular names of products.

In spite of its 1,189 pages the book is not too bulky to be held in the hand, and the general "get up" is excellent; the paper is thin but tough, and the type is clear and well chosen.

The alphabetical arrangement is the same as that of the "Dictionary," and is based upon the scientific names of the animals, plants, and minerals; the index at the end gives the European and vernacular names. It thus becomes an easy task to "run down" the information one is seeking, and the marginal references and page headings are also of assistance in this connection. At the end of the account of each product is given a list of the works consulted, and this bibliography supplies references for making more extended research.

The vast area of India, which (including native States) is usually given as 1,560,000 square miles, a territory larger than the European Continent if we exclude Russia, necessarily has within its borders climates and soil conditions of widely different characters. The commercial products of such a large territory are likewise numerous and varied, including not only the spontaneous products of Nature, but also the results of human industry and labour. Considering its vast extent, India is not rich in minerals, or her mineral wealth is not developed to its full extent, consequently the greater part of the work is devoted to descriptions of products derived from the vegetable kingdom.

For students of economic botany it will, therefore, form an excellent text-book, and planters and commercial men, both at home and abroad, will find it an exceedingly valuable book of reference. To the general reader its pages are not devoid of interest, especially those devoted to the history and descriptions of the common articles of food and drink which are derived from India.

"Nature and Ornament. I. Nature the Raw Material of Design." By Lewis F. Day. 8vo., 126 pp. 87 figures (350 drawings). (B. T. Batsford, London, 1908.) 5s. net.

Whatever the conditions and materials governing its use, and however simple and abstract its expression, decorative art, from the severity of the Greek fret to the luxuriance of Indian ornament, has almost invariably received its inspiration from Nature. The student therefore can hardly be too frequently urged to make a close study of natural objects, with the view both of interpreting existing design and of broadening the basis of future work by a deeper insight into the infinite variety of line, form, shade and colour abounding in animal and plant life. The author sets out with the purpose of showing "the development of ornament from natural form and its constant relation to Nature," and of deducing from "the practice of past masters something like guiding principles to help the student in making his own best use of natural form in ornament"; but the present volume is devoted almost exclusively to the illustration of the variety and character of common forms of plant life. Seeing that the purpose and value of the book lie in urging the student to make his own drawings from nature, more than one-half is, we think, an excessive proportion to have devoted to plant drawings of no intrinsic worth. A number of figures unnecessarily duplicated, and others drawn from inferior specimens, might well be replaced by simple studies of animal form, e.g. wing, egg, fish-scale, shell, horn, &c., which are of constant recurrence in design.

Successive chapters are devoted to the examination of trees, stalks,

leaves, flowers and buds, seed vessels, &c., and attention called to the details most likely to be of value to the student. In spite of special assistance to keep the author "within the bounds of botanical accuracy," the names attached to the drawings are the weakest feature in the book. Fig. 53—"Wild mint" is not a mint. Fig. 54 is not the *Arbor-vitae*. Fig. 55—The seed pods drawn are not those of *Primula vittata*. Figs. 38, 49, 61—The helminth and nipplewort are included as sow-thistles. Figs. 54, 55 and 57—Six distinct plants, including the Lucerne, Medick and Lotus, are all named "Vetch." Drawings of the Milk and Nodding thistles are not named at all. Fig. 59—Oak and acorns includes four species of Oak. In view of the rather gratuitous criticism of botanists and gardeners, we fail to understand the use of the name "*Biscutella*" for the buckler mustard or "the *canariensis*" for the Canary creeper, and most gardeners, we think, would discredit the statement (p. 99) that the little bedding *Calceolaria* if not maltreated by pinching would become an elegant plant 5 feet high with flowers of a different shape! The statement on p. 71 that "the connection between seed and root is nowhere more clearly demonstrated than in the onion, where you may see in the seed-head itself actual bulbs beginning already to send out their shoots of green" is surely unintelligible. The author is on surer ground in the first and last chapters, where space is found for a defence of ornament for ornament's sake, although it is already generally conceded that that is truly ornamental which rightly pleases, quite apart from story, symbol or the definite embodiment of natural form.

"Trees: a Handbook of Forest Botany for the Woodlands and the Laboratory." By the late H. Marshall Ward, Sc.D., F.R.S. 8vo., 161 pp. (University Press, Cambridge, 1908.) 4s. 6d. net.

Mr. Percy Groom, in bringing out this volume, has dealt with a delicate subject in a commendable way, for it is no easy task to bring out a new edition of another person's book. There is certainly much to commend and little to find fault with in this revised edition—perhaps the most valuable work of its kind that we possess. Not only is the amateur well catered for but the professional in such matters will find much to interest him in the lucid and carefully thought out articles which occur under each heading. The descriptions of the various trees are particularly good, the peculiarities of each being well defined, though, as was necessary in a handbook of this kind, much condensed. Altogether we can highly recommend this book on trees, and the numerous well-executed illustrations go far in elucidating the text.

"Fruit Trees and their Enemies, with a Spraying Calendar." By S. Pickering, M.A., F.R.S., and F. V. Theobald, M.A. 8vo., 118 pp. (Simpkin, Marshall, London, 1908.) 1s. 6d. net.

A most useful little book has lately been published on spraying fruit trees with fungicides and insecticides. The joint authors, Mr. Spencer Pickering and Mr. F. V. Theobald are both well-known experts in the matter of enemies to our fruit crops. In some general remarks upon spraying the authors give, on page 2, some good advice. "Spraying, to be successful, must be done intelligently; the grower must know

what to spray for, what to spray with, and when to do it. To spray a tree without any definite object is like giving a man physic without knowing what is the matter with him, or whether anything is the matter at all ;” and on page 14 they say: “Above all it should be remembered that it is a mere waste of money to spray, unless the spraying is done thoroughly.” A chapter is devoted to “appliances and the work that they are intended to perform ;” this is followed by descriptions of the various materials used for making spray washes, and twenty-eight recipes are given for their manufacture. Persons who use a large amount of fungicides and insecticides are recommended to make up their own washes, but “with smaller growers and gardeners it is otherwise, and the difference in the cost of buying or of making up the insecticides would be counterbalanced by the probable superiority of these substances when made by the skilled chemical manufacturer.” This chapter is followed by one on pests ; they are mentioned under the names of the trees or plants (which are arranged alphabetically) that they usually attack. The remedies and the time for their application for each pest are given. A spraying calendar, which should prove of great service to fruit growers, is given at the end of the book. On page 110 is a most useful table showing the amounts of the ingredients which are required to make 1, 10, or 100 gallons of wash and their percentages of strength. This table will prove of the greatest assistance when compounding a different quantity of wash from that given in the recipe. We can most confidently recommend this little book to the attention of all fruit growers ; its price places it within the reach of everyone who cultivates fruit.

“Handbook of Hardy Trees and Shrubs.” By George Bunyard, V.M.H. 8vo., 160 pp. (Bunyard, Maidstone, 1908.) 3s. 6d. net.

This book can only be described as an extended nurseryman’s catalogue. It unfortunately omits much that might usefully have been included. In the first place, there is little to guide the planter of trees and shrubs, the descriptions of the latter being sadly inadequate, while the practical operations are very cursorily passed over, and throughout the whole book, orthography in particular has received little attention at the hands of the reader. Thus *Eucryphia* and *Choisya* are both wrongly spelt at page 113, while on the plate, opposite the same page *Carpenteria* is incorrectly rendered. The rendering of *Weigelia* on the plate opposite page 92 is incorrect, as is also *Aucuparia* (page 19), *Olearia* (page 180), *Hamamelis* (page 81), *Euonymus*, and hosts of others.

There are a number of illustrations, and useful lists of trees and shrubs for various soils and positions are given at the end of the work.

“Timber.” By J. R. Baterden, Assoc. M.Inst.C.E. 8vo., 351 pp. (Constable, London, 1908.) 6s. net.

This is probably the most exhaustive and reliable of the few works that have been written on the subject of timber ; indeed a vast amount of useful information has been crammed into some 350 pages. The illustrations, too, are good, and assist in many cases in explaining the text, while the tables have been compiled with care, and are no mere lists of dry figures.

European timbers are first described, then a chapter each to those of America, (North and South), Japan, Africa and Australia, New Zealand and Tasmania. The concluding chapters deal in a practical and exhaustive way with the causes of decay in timber, seasoning, defects, impregnation, and tests as to the strength of various woods. Altogether the book is of particular value to all who are interested in the conversion of either our native or foreign timbers, while even the timber merchant will find much to interest him as to the best means of seasoning and preparing his commodity for the market.

POTATOS AT WISLEY, 1908.

NINETY-SIX stocks of potatoes were received at the Garden for trial in 1908. They were planted on April 7, in rows 3 feet apart, and the "sets" 18 inches apart in the rows. The ground had been deeply dug and moderately manured during the previous winter. All made excellent clean growth, and were remarkably free from disease, producing very good crops generally. By reason of their good crop and fine appearance the following varieties were ordered to be cooked :—

British Champion.
Courteen Seedling.

Devanha Seedling.
Midlothian Early.

LIST OF VARIETIES.*

- | | |
|------------------------------------|-------------------------------|
| 1. Ninety-fold. | 80. Supreme. |
| 2. Sir John Llewelyn. | 81. General Roberts. |
| 3. Noroton Beauty. | 82. British Queen. |
| 4. Albert Victor. | 83. Windsor Castle. |
| 5. Pearl, Tho. | 84. Cigarette. |
| 6. Epicure. | 85. General French. |
| 7. Recorder. | 86. Barr's Improved Snowdrop. |
| 8. Myatt's Early Prolific Ashleaf. | 87. Early Regent. |
| 9. Ashleaf Old Short Top. | 88. Early Peter. |
| 10. May Queen. | 89. Midlothian Early. |
| 11. Harbinger. | 40. Yule's Success. |
| 12. Dalmeny Early. | 41. Wood Green Wonder. |
| 13. Ringleader. | 42. Dreadnought. |
| 14. Sharpe's Express. | 43. St. Patrick. |
| 15. Sharpe's Victor. | 44. Suffragette, The. |
| 16. Sharpe's Express. | 45. White Eye Ruddy. |
| 17. Royal Kidney. | 46. O'Brien's Celts. |
| 18. Dalmeny Beauty. | 47. Glendon Hall. |
| 19. Courteen Seedling. | 48. Invincible. |
| 20. Sharpe's Express. | 49. Weston Wonder. |
| 21. Syon House Prolific. | 50. Gundrada. |
| 22. Noroton Beauty. | 51. British Queen. |
| 23. Sharpe's Victor. | 52. British Queen No. 2. |
| 24. Sharpe's Express. | 53. Russet Queen. |
| 25. Leader. | 54. Table Talk. |
| 27. Early Rose. | 55. Dalhousie. |
| 28. Early Puritan. | 56. Colleen, The. |
| 29. Beauty of Hebron. | 57. Colleen, The. |

* All trials in the Wisley Garden are carried out under number only until judging is completed. The number prefixed to the name of the variety in the Report corresponds with that by which alone the variety was known until judgment had been given. Fellows visiting the Garden and noticing any plant under a number can easily ascertain its name later by reference to the Report in the Journal.

- | | |
|---|--------------------------|
| 58. Duchess of Cornwall (Irish Seed). | 79. Provost, The. |
| 59. Duchess of Cornwall (English Seed). | 80. Talisman. |
| 60. Perfection. | 81. Alderman. |
| 61. Rising Sun. | 82. Masterpiece. |
| 62. Arbitrator. | 83. Rob Roy. |
| 63. Gift, The. | 84. British Champion. |
| 64. Devanha Seedling. | 85. Colleen, The. |
| 65. Gardener, The. | 86. Conquering Hero. |
| 66. Factor, The. | 87. Duchess of Cornwall. |
| 67. O'Brien's Russet. | 88. Diamond, The. |
| 68. Ever Green. | 89. Schoolmaster. |
| 69. Irish Beauty. | 90. Duchess of Cornwall. |
| 70. Irish Queen. | 91. Scottish Triumph. |
| 73. Northern Star. | 92. Satisfaction. |
| 74. Mairsland Queen. | 93. King. |
| 75. President. | 94. Emperor. |
| 78. Scot, The. | 95. Bell's Seedling. |
| | 96. Cobham Surprise. |

Nos. 26, 71, 72, 76 and 77 were seedlings (see p. 537) not yet named.

A.M. = Award of Merit.

F.C.C. = First-class Certificate.

4. Albert Victor (Barr).—Early; plant of medium size, fairly vigorous, compact, erect; tubers compact in hill; branches few, fairly stout, triangular, dark green; leaves large; leaflets long, broad, rough, flat; flowers few, small, pale; tubers fairly large, elongated, flattened, rather irregular; skin smooth, finely russeted; colour uniform dull white; size and shape rather variable; eyes many, scattered, fairly large, deep, light, uniform; eyebrows prominent, fairly long; flesh firm, of medium grain, juicy, dull white.

81. Alderman (Massey).—Plant large, vigorous. Tubers poor and valueless.

62. Arbitrator (Sharpe).—Plant small, rather weak, spreading, fairly erect; branches few, slender, triangular, rather light green; leaves small; leaflets short, rather narrow; flowers few, rather dark; tubers of medium size, kidney, regular; skin rough, rather coarsely russeted, dull white in colour; uniform in size; fairly uniform in shape; eyes scattered, small, shallow, fairly prominent, light, uniform; eyebrows inconspicuous, short; flesh firm, of fine grain, juicy, dull white.

9. Ashleaf Old Short-top (Barr).—Early; plant moderate, fairly vigorous, spreading, erect; branches few, rather stout, triangular, narrowly winged, dark green tinged with reddish-brown; leaves rather small; leaflets rather short, almost smooth, flat; tubers small, elongated; skin fairly smooth, very slightly russeted, uniform clear white; variable in size; eyes few, mostly at the apex, large, shallow-sunken, compound, light, uniform; eyebrows inconspicuous; flesh firm, grain fine, juicy, dull white.

86. Barr's Improved Snowdrop (Barr).—Early; plant large, vigorous, spreading; branches many, stout, triangular, dark green slightly tinged

with reddish-brown; leaves of medium size; leaflets long, rather broad, smooth, flat; flowers few, large, pinkish-white; tubers large, elongated, flattened, irregular; skin rough, coarsely russeted, uniform dull white in colour; size uniform; shape variable; eyes few, mostly at the apex, small, shallow, compound, light, variable in character; eyebrows inconspicuous, short; flesh soft, rather coarse in grain, juicy, dull white.

29. Beauty of Hebron (Barr), **A.M.** August 14, 1900.—Early; plant large, vigorous, compact; tubers compact in hill; branches stout, triangular, rather light green; leaves large; leaflets long, broad, smooth, flat; flowers few, small, pale; tubers intermediate, elongated, flattened, irregular; skin smooth, dull white; size and shape uniform; eyes many, scattered, large, shallow, compound, light, uniform; eyebrows prominent, long, distinct in colour; flesh firm, rather coarse-grained, juicy, clear white.

95. Bell's seedlings (Bell).—Crop very poor.

84. British Champion (G. Carter), **A.M.** September 29, 1908.—Late; plant large, vigorous, spreading, erect; tubers compact in hill; branches many, stout, triangular, light green slightly tinged with reddish-brown; leaves large; leaflets long, broad, smooth, flat; flowers many, large, rather dark; tubers fairly large, elongated, flattened, regular; skin smooth, very finely russeted, dull white; size and shape uniform; eyes few, scattered, small, rather deep-sunken, single, light, uniform; eyebrows inconspicuous; flesh firm, fine-grained, juicy, dull white.

82, 51. British Queen (Barr, Sands), **A.M.** August 15, 1905.—Mid-season; plant large, vigorous, spreading; tubers rather scattered; branches few, stout, triangular, dark green tinged with reddish-brown; leaves medium to large; leaflets long, broad, smooth, flat or slightly crumpled; flowers pale; tubers small or medium-sized, elongated, flattened, regular; skin smooth, dull white in colour; size uniform; shape variable; eyes many, mostly at apex, small to fairly large, shallow; eyebrows prominent; flesh firm, fine-grained, juicy, dull white.

52. British Queen No. 2 (Sands).—A form of the preceding.

84. Cigarette (Barr), **A.M.** November 21, 1905.—Early; plant large, vigorous, spreading, erect; tubers compact in hill; branches stout, triangular, light green much tinged with reddish-brown; leaves of medium size; leaflets smooth, flat; flowers few, small, pale; tubers intermediate in size, kidney, irregular; skin rough, finely russeted, dull white; size variable, shape uniform; eyes few, scattered, small, shallow, compound, light, uniform; eyebrows inconspicuous, long, distinct in colour; flesh firm, fine-grained, juicy, clear white.

96. Cobham Surprise (Wiles).—Late; plant large, fairly vigorous, very spreading, decumbent; branches many, slender, triangular, dark green tinged with reddish-brown; leaves small; leaflets short, narrow, smooth, crumpled; flowers few, large, pale blue; tubers small, kidney irregular; skin rough, finely russeted, dull white; variable in size and shape; eyes few, scattered, large, shallow, single, light, uniform; eyebrows prominent, long; flesh firm, fine-grained, rather dry, dull white.

56, 57, 85. The Colleen (Sands, J. Veitch, Williamson), **A.M.** August 9, 1907.—Midseason; plants large, vigorous, spreading, almost erect; tubers fairly compact in hill; branches few, stout, triangular, dark green

tinged with reddish-brown; leaves medium to large, leaflets fairly long, broad, smooth, flat; flowers few or many, pale; tubers medium-sized, round, flattened, regular; skin smooth, finely russeted, clear white; size and shape uniform; eyes many, scattered, small, shallow, compound, light, uniform; eyebrows prominent or inconspicuous, long; flesh firm, fine-grained, juicy, dull white.

86. Conquering Hero (Williamson).—Late; plant large, vigorous, fairly compact, erect; tubers scattered; branches few, stout, triangular, rather dark green much tinged with reddish brown, the nodes more deeply coloured; leaves large; leaflets long, broad, smooth, flat; flowers many, small, rather dark; tubers large, elongated, regular; skin rather rough, finely russeted, dull white; size and shape fairly uniform; eyes few, scattered, large, shallow, compound, light, uniform; eyebrows inconspicuous, long; flesh firm, fine-grained, juicy, dull white.

19. Courteen Seedling (Taylor), **A.M.** for cultivation in pots, July 31, 1908.—Early; plant small, vigorous, compact, erect; tubers compact in hill; branches rather slender, triangular, narrowly winged, green slightly tinged with reddish-brown; leaves medium-sized; leaflets medium-sized, almost smooth, flat; tubers medium-sized, round, flattened, regular; skin smooth, finely russeted, clear white; size and shape uniform; eyes scattered, small, shallow, mostly single, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, clear white.

55. Dalhousie (Sands), **A.M.** October 24, 1905.—Plant very large, very vigorous, fairly compact, erect; tubers scattered; branches stout, triangular, dark green tinged with reddish-brown; leaves large; leaflets long, broad, smooth, flat; flowers many, medium-sized, dark; tubers medium-sized, elongated, regular, skin rough, coarsely russeted, colour light brown; size and shape uniform; eyes few, scattered, small, shallow, slightly sunken, single, light, uniform; eyebrows inconspicuous, long; flesh very firm, fine-grained, juicy, dull white.

18. Dalmeny Beauty (Sydenham), **A.M.** September 11, 1903.—Mid-season; plant large, vigorous, compact, erect; branches very stout, triangular, slightly winged, green tinged slightly with reddish-brown; leaves medium-sized; leaflets medium-sized, almost smooth, flat; flowers few, small, pinkish-white; tubers medium-sized, almost round, fairly regular; skin rough, coarsely russeted, dull white; size and shape uniform; eyes few, scattered, small, fairly deep, single, light, uniform; eyebrows inconspicuous; flesh firm, fine-grained, juicy, dull white.

12. Dalmeny Early (Barr).—Early; plant large, very vigorous, compact, erect; branches few, very stout, triangular, narrowly winged, dark green tinged with reddish-brown; leaves large; leaflets medium-sized, fairly smooth, rather crumpled; flowers few, large, pinkish-white; tubers large, elongated, flattened, regular; skin rough, rather coarsely russeted, uniform clear white; size fairly uniform; eyes small, shallow, single, light, uniform; eyebrows inconspicuous; flesh firm, rather coarse-grained, juicy, dull white.

64. Devanha Seedling (W. Smith), **A.M.** September 29, 1908.—Late; plant large, vigorous, spreading, erect; branches few, fairly stout, triangular, rather light green; leaves medium-sized; leaflets medium-sized, smooth, flat; flowers few; tubers medium-sized, elongated, flattened,

regular, skin smooth, finely russeted; dull white; size and shape uniform; eyes few, scattered, small, rather shallow-sunken, single, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

88. Diamond, The (Barr).—Late; plant fairly large, vigorous, spreading, erect; tubers compact in hill; branches few, stout, triangular, dark green slightly tinged with reddish-brown; leaves large; leaflets long, broad, almost smooth, flat; flowers many, large, pale; tubers small, round, flattened, regular; coarsely russeted, dull white; size and shape uniform; eyes few, scattered, rather large, shallow, compound, light, uniform; eyebrows inconspicuous, long; flesh firm, fine-grained, juicy, dull white.

42. Dreadnought (Pickett).—Late; plant large, vigorous; crop poor.

58, 59, 87, 90. Duchess of Cornwall (J. Veitch, Irish and English seed; Williamson, Barr), **A.M.** October 24, 1905.—Midseason or late; plant fairly large, vigorous, spreading, erect; tubers compact in hill; branches few, stout, triangular, dark green tinged with reddish-brown leaves large; leaflets long, broad; flowers many, large, dark; tubers large, elongated, flattened, regular; skin rough, coarsely russeted, white; size uniform, shape fairly uniform; eyes few, scattered, shallow, single, light, uniform; eyebrows inconspicuous; flesh firm, fine-grained, juicy, dull white.

88. Early Peter (Sharpe), **A.M.** July 25, 1899.—Early; plant large, vigorous, spreading; tubers compact in hill; branches many, fairly stout, triangular, rather dark green; leaves medium-sized; leaflets rather long, fairly broad, smooth, flat; flowers few, small, pale; tubers medium-sized, elongated, regular; skin rather rough, coarsely russeted, dull white; size and shape uniform; eyes few, mostly at apex, small, shallow, compound, light, fairly uniform in character; eyebrows inconspicuous, short; flesh firm, rather coarse-grained, juicy, clear white.

28. Early Puritan (Barr), **A.M.** August 16, 1900.—Early; plant medium-sized, fairly vigorous and compact, erect; tubers compact in hill; branches stout, triangular, light green, a little tinged with brown; leaves fairly large; leaflets medium-sized, smooth, flat; flowers few, small, pale; tubers of medium size, elongated, flattened, rather irregular; skin smooth, clear white; size and shape uniform; eyes many, scattered, rather large, deep-sunken, single, light, uniform; eyebrows prominent, long, distinct in colour; flesh firm, coarse-grained, juicy, dull white.

87. Early Regent (Barr), **F.C.C.** October 10, 1898.—Early; plant large, vigorous, spreading, decumbent; tubers compact in hill; branches many, stout, triangular, rather dark green; leaves medium-sized; leaflets medium-sized, smooth, flat; flowers few, small, pale; tubers large, elongated, flattened; skin smooth, finely russeted, clear white; size fairly uniform, shape variable; eyes many, scattered, large, deep-sunken, compound, light, fairly uniform; eyebrows prominent, long, distinct in colour; flesh firm, fine-grained, juicy, clear white.

27. Early Rose (Barr).—Early; plant large, very vigorous, fairly compact, erect; tubers compact in hill; branches many, stout, triangular, dark green; leaves large; leaflets long, rather narrow, smooth, flat; flowers few, small, pale; tubers medium-sized, elongated, flattened; skin smooth, light pink tinged slightly with deeper pink; size and shape

variable; eyes many, scattered, large, deep-sunken, single, rather dark-coloured, uniform; eyebrows prominent, long, distinct in colour; flesh firm, coarse-grained, juicy, dull white.

94. Emperor (Bell).—Late; plant large, vigorous, fairly compact, erect; branches few, stout, triangular, dark green much tinged with reddish-brown; leaves large; leaflets long, rather narrow, rough, crumpled; flowers many; tubers medium-sized, round, flattened; skin rough, coarsely russeted, dark purple; size and shape fairly uniform; eyes few, mostly at apex, rather small and deep-sunken, single, dark, uniform; eyebrows inconspicuous, short; flesh firm, coarse-grained, juicy, dull white.

6. Epicure (Barr), **A.M.** August 15, 1905.—Early; plant large, vigorous, spreading, erect; tubers compact in hill; branches many, stout, triangular, rather dark green tinged with reddish-brown; leaves medium-sized; leaflets medium-sized, fairly smooth, flat; flowers few, small, pale; tubers small, slightly elongated, flattened; skin smooth, dull white, a little and variably tinged with pink; size and shape variable; eyes large, deep-sunken, single, light, variable in character; eyebrows prominent, short, indistinct in colour, flesh white.

68. Ever Green (O'Brien).—Late; plant large, vigorous, very spreading, decumbent; tubers compact in hill; branches many, fairly stout, triangular, dark green tinged with reddish-brown; leaves rather small; leaflets medium-sized, smooth, slightly crumpled; flowers small, many, pale; tubers small, round, flattened, fairly regular; skin smooth, dull white or light red; size and shape variable; eyes many, scattered, rather large, shallow-sunken, single, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

66. Factor, The (Sydenham), **F.C.C.** April 25, 1905.—Late; plant large, vigorous, spreading, erect; tubers rather scattered in hill; branches few, stout, triangular, rather light green, a little tinged with reddish-brown; leaves large; leaflets long, broad, smooth, flat; flowers many, medium-sized, rather dark; tubers medium-sized, elongated; skin fairly smooth, finely russeted, dull white; size uniform, shape fairly uniform; eyes few, scattered, small, shallow-sunken, mostly single, light, uniform; eyebrows inconspicuous, rather long; flesh firm, fine-grained, juicy, dull white.

65. Gardener, The (Yule), **A.M.** October 24, 1905.—Late; plant very large, vigorous, fairly compact, erect; branches many, stout, triangular, rather dark green a little tinged with reddish-brown; leaves rather large; leaflets long, broad, smooth, very slightly crumpled; flowers many, medium-sized, rather dark; tubers large, elongated, flattened, regular; skin rough, coarsely russeted, dull white; size and shape fairly uniform; eyes few, scattered, small, shallow, compound, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

35. General French (Barr), **A.M.** October 1, 1901.—Late; plant large, very vigorous, spreading, erect; tubers fairly compact in hill; branches many, stout, triangular, dark green slightly tinged with reddish-brown; leaves large; leaflets long, broad, fairly smooth, rather crumpled; flowers many, rather small, dark; tubers large, elongated, flattened, regular; skin rough, finely russeted, uniform dull white; size and shape fairly uniform;

eyes few, mostly at apex, large, shallow, compound, light, uniform; eyebrows inconspicuous, long; flesh firm, fine-grained, fairly juicy, dull white.

81. General Roberts (Barr).—Late; plant large, vigorous, rather spreading, erect; tubers rather scattered; branches stout, triangular, dark green a little tinged with reddish-brown; leaves large; leaflets fairly long, broad, smooth, rather crumpled; flowers many, fairly large, dark; tubers medium-sized, fairly round, flattened, regular; skin rough, finely russeted, dull white; size fairly uniform, shape variable; eyes fairly numerous, scattered, medium-sized, deep-sunken, compound, light, uniform; eyebrows inconspicuous, long; flesh firm, fairly fine-grained, juicy, dull white.

68. Gift, The (Sharpe).—Mid-season; plants small, weak, fairly healthy, spreading, decumbent; branches few, slender, triangular, rather light green, a little tinged with reddish-brown; leaves small; leaflets short, rather narrow, smooth, crumpled; flowers few, rather dark; tubers medium-sized, elongated; skin smooth, finely russeted, light, clear white; size and shape variable; eyes fairly numerous, scattered, rather large, shallow, compound, light uniform; eyebrows rather prominent, long; flesh firm, fine-grained, juicy, light dull white; plants very variable.

47. Glendon Hall (Mrs. Home Booth).—Late; plant large, vigorous, healthy, spreading, erect; tubers compact in hill; branches many, stout, triangular, light green; leaves large; leaflets long, rather narrow, smooth, flat; flowers few, large, pale; tubers large, elongated, flattened, rather irregular; skin rough, coarsely russeted, dull white; size and shape fairly uniform; eyes many, mostly at the apex, large, deep, mostly single, light, uniform; eyebrows prominent, long, indistinct; flesh firm, fine-grained, juicy, dull white.

50. Gundrada (Kenward).—Late; plant medium-sized, vigorous, spreading, decumbent; tubers fairly compact in hill; branches few, fairly stout, triangular, light green slightly tinged with reddish-brown; leaves medium-sized; leaflets long, fairly broad, fairly smooth, flat; flowers few, pale; tubers small, elongated, flattened, regular; skin rough, coarsely russeted, dull white; size and shape variable; eyes few, mostly at the apex, small, shallow, slightly sunken, single, light, uniform; eyebrows rather prominent, long; flesh firm, coarse-grained, juicy, dull white. Plants varying in growth and habit.

11. Harbinger (Barr), **A.M.** August 5, 1897.—Early; plant rather small, fairly vigorous, fairly compact and erect; tubers compact in hill; branches rather few, slender, triangular, slightly winged, light green; leaves very large; leaflets fairly long, very broad, smooth, flat; tubers small, round, flattened, irregular; skin smooth, very finely russeted, dull white; size and shape variable; eyes fairly numerous, scattered, medium-sized, rather shallow, mostly compound, light, uniform; eyebrows very inconspicuous, short, rather distinct in colour; flesh soft, fine-grained, rather dry, clear white.

48. Invincible (Letts).—Plants large. Tubers too poor for description.

69. Irish Beauty (Cunningham).—Late; plant very large and vigorous, very spreading, erect; tubers compact in hill; branches many, mostly very stout, triangular, light green tinged with reddish-brown;

leaves large; leaflets long, fairly broad, smooth, slightly crumpled; flowers few, pale; tubers medium-sized, round, flattened; skin very rough, coarsely russeted, dull white, a little tinged with pink; size and shape uniform; eyes very few, scattered, small, rather shallow, single, rather dark, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

70. Irish Queen (Cunningham).—Midseason; plant large, vigorous, spreading, erect; tubers compact in hill; branches many, stout, triangular, light green; leaves large; leaflets long, broad, smooth, flat; tubers medium-sized, round, flattened, regular; skin rough, very coarsely russeted, clear white, a little tinged with pink and mottled; size and shape uniform; eyes few, distributed singly, not very large, deep, single, light, uniform; eyebrows prominent, short, distinctly coloured pink; flesh firm, fine-grained, juicy, dull white.

98. King (Bell).—Plant small, weak, diseased. Crop very poor.

25. Leader (Massey).—Early; plant large, very vigorous, slightly diseased, spreading, fairly erect; tubers compact in hill; branches many, rather stout, triangular, dark green; leaves medium-sized; leaflets medium-sized, rather narrow, smooth, flat; flowers few, small, light-coloured; tubers large, elongated, flattened, regular; skin roughish, finely russeted, dull white; size uniform, shape variable; eyes many, scattered, large, shallow, compound, light, variable in character; eyebrows prominent, long; flesh rather soft, coarse-grained, juicy, clear white.

74. Mairsland Queen (Bettinson).—Midseason; tubers scattered, tubers medium-sized, round, regular; skin smooth, finely russeted; fairly clear white; size and shape uniform; eyes fairly numerous, scattered, small, shallow, mostly single, light, uniform; eyebrows inconspicuous, medium-sized; flesh firm, fine-grained, juicy, dull white.

82. Masterpiece (Massey).—Late; plant large, vigorous, fairly compact, erect; branches many, very stout, triangular, rather light green; leaves small; leaflets rather short, narrow, slightly rough, crumpled; flowers many, large, pale; tubers rather large, round, flattened, rather irregular; skin rough, rather coarsely russeted, dull white; size and shape variable; eyes few, scattered, large, shallow, compound, light, uniform; eyebrows inconspicuous, long; flesh firm, coarse-grained, juicy, dull white.

10. May Queen (Barr).—Early; plant large, vigorous, rather spreading, fairly erect; tubers compact in hill; branches intermediate in number, stoutness, and depth of colour, a little tinged with reddish-brown; leaves very large; leaflets very long, broad, rather rough, flat; flowers few, small, pinkish-white; tubers fairly large elongated, flattened, irregular; skin rather rough, finely russeted, dull white; size fairly uniform, shape variable; eyes few, scattered, small, fairly prominent, compound, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

89. Midlothian Early (Dobbie), **A.M.** July 31, 1908.—Early; plant large, vigorous; tubers compact in hill; branches few, stout, triangular, dark green slightly tinged with reddish-brown; tubers large, elongated, flattened; skin finely russeted, clear white; size and shape uniform; eyes few, scattered, small, shallow, single, light, uniform; eyebrows

inconspicuous, short, distinctly coloured ; flesh soft, fine-grained, juicy, light yellow.

8. Myatt's Early Prolific Ashleaf (Barr).—Early ; plant large, very vigorous, spreading, erect ; branches many, stout, triangular, rather light green ; leaves fairly large ; leaflets medium-sized, smooth, flat ; flowers small, pinkish-white ; tubers rather small, kidney ; skin rough, uniform, dull white ; size variable ; eyes few, scattered, small, rather deep-sunken, single, light, uniform ; eyebrows inconspicuous, short ; flesh firm, medium in grain, juicy, light yellowish.

1. Ninety-fold, (Barr), **A.M.** July 10, 1900.—Early ; plant medium-sized, vigorous, compact, decumbent ; branches many, stout, triangular, slightly winged, dark green ; leaves medium-sized ; leaflets medium, sized, smooth-flat ; flowers few, small, pale ; tubers small, elongated, very irregular ; skin smooth, dull white ; eyes many, scattered, medium-sized, prominent, compound, light, variable ; eyebrows fairly prominent, long ; flesh firm, coarse-grained, juicy, dull white.

3, 22. Noroton Beauty (Barr, R. Veitch).—Early ; plant medium or large, vigorous, compact or spreading, erect or decumbent ; tubers compact in hill ; branches few or rather numerous, fairly stout, triangular, rather dark green, sometimes slightly tinged with reddish-brown ; leaves medium-sized or large, leaflets fairly long and broad, smooth, flat or crumpled ; flowers, few small, pale ; tubers medium-sized or large, round, flattened, regular ; skin smooth, finely russeted, clear white variably tinged and mottled with pink ; size and shape uniform ; eyes many, scattered, large, deep, single or compound, dark, variable in character ; eyebrows inconspicuous, short, distinct in colour ; flesh firm, juicy, clear white.

73. Northern Star (Bettinson).—Late ; plant large, vigorous, compact, erect ; tubers scattered ; branches many, mostly stout, triangular, rather light green ; leaves fairly large ; leaflets medium-sized, smooth, flat ; tubers rather large, round, very irregular ; skin smooth, finely russeted, dull white ; eyes few, scattered, small, deep, single, light, uniform ; eyebrows inconspicuous, long ; flesh firm, fine-grained, juicy, dull white.

46. O'Brien's Celts (J. O'Brien).—Plant small, weak, diseased.

67. O'Brien's Russet (J. O'Brien).—Late ; plant large, vigorous, spreading, erect ; tubers rather scattered ; branches many, mostly stout, triangular, rather light green ; leaves large ; leaflets long, fairly broad, smooth, flat ; flowers many, rather dark ; tubers medium-sized, round, flattened ; skin rough, coarsely russeted, dull white, a little spotted with pink ; size uniform, shape fairly so ; eyes fairly numerous, scattered, small, very deep, single, dark, uniform ; eyebrows inconspicuous, short ; flesh firm, fine-grained, juicy, dull white.

5. Pearl, The (Barr).—Early ; plant large, very vigorous, spreading, slightly decumbent ; tubers compact in hill ; branches fairly stout, triangular, dark green, leaves large ; leaflets long, fairly broad, rather rough, flat ; flowers few, small, pinkish-white ; tubers medium-sized, elongated ; skin smooth, finely russeted, clear white ; size uniform ; eyes few, scattered, small, shallow, single, light, uniform ; eyebrows inconspicuous, short ; flesh firm, coarse-grained, juicy, clear white.

60. Perfection (Massey).—Plant small, but vigorous ; tubers small ; crop poor.

75. President (Bettinson).—Midseason ; plant large, vigorous, compact, erect ; tubers fairly compact in hill ; branches few, stout, triangular, rather light green, a little tinged with reddish-brown ; leaves large ; leaflets long rather narrow, smooth, flat ; flowers many, rather dark ; tubers medium-sized, round ; skin rough, coarsely russeted, dull white ; size and shape uniform ; eyes rather few, scattered, small, shallow, single, light, uniform ; eyebrows inconspicuous, short ; flesh firm, fine-grained, juicy, dull white.

79. Provost, The (Dobbie), **A.M.** October 15, 1907.—Late ; plant large, vigorous, fairly compact, erect ; tubers compact in hill ; branches many, stout, triangular, fairly dark green, much tinged with reddish-brown, the nodes rather deeper in colour ; leaves large ; leaflets long, rather narrow, slightly crumpled ; flowers many, pale ; tubers rather large, kidney, regular ; skin fairly smooth, finely russeted, dull white ; size and shape uniform ; eyes fairly numerous, scattered, rather large, shallow, mostly single, light, uniform ; eyebrows inconspicuous, rather short ; flesh firm, fine-grained, juicy, dull white.

7. Recorder (Barr).—Early ; plant fairly large and vigorous, erect ; tubers scattered ; branches few, rather slender, nearly round, slightly winged, rather dark green ; leaves and leaflets medium-sized, smooth, flat ; flowers few, large, pale ; tubers small, elongated ; skin, fairly smooth, dull white ; size and shape rather variable ; eyes few, mostly at apex, small, shallow, single, pale, uniform ; eyebrows inconspicuous, short ; flesh firm, fine-grained, juicy, clear white.

13. Ringleader (Barr), **A.M.** July 10, 1900.—Early ; plant medium-sized, vigorous, rather spreading ; tubers compact in hill ; branches many, slender, triangular, fairly light green ; leaves medium-sized ; leaflets long, smooth, flat ; flowers few, small, flat, pinkish-white ; tubers medium-sized, elongated ; skin slightly rough, finely russeted, dull white ; size and shape uniform ; eyes few, scattered, small, shallow, compound, light, uniform ; eyebrows very inconspicuous, short ; flesh firm, rather coarse-grained, juicy, dull white.

61. Rising Sun (Sharpe).—Plant small ; crop very poor.

83. Rob Roy (Massey).—Late ; plant fairly large, vigorous, spreading, erect ; branches few, stout, triangular, light green slightly tinged with reddish-brown, the nodes more deeply coloured ; leaves large ; leaflets long, rather narrow, rather rough, slightly crumpled ; flowers fairly many, large, pale ; tubers rather small, round, flattened ; skin rough, coarsely russeted, rather dull white ; size and shape uniform ; eyes few, scattered, small, shallow-sunken, compound, light, uniform ; eyebrows inconspicuous, short ; flesh firm, fairly fine-grained, juicy, dull white.

17. Royal Kidney (Sydenham).—Midseason ; plant large, vigorous, spreading, erect ; branches many, slender (mostly), triangular, narrowly winged, fairly dark green ; leaves rather small ; leaflets rather short, smooth, flat ; tubers small, elongated, slightly flattened, regular ; skin fairly smooth, slightly russeted, clear white ; size and shape uniform ; eyes few, scattered, small, deep, single, light, uniform ; eyebrows slightly prominent, short ; flesh firm, coarse-grained, juicy, dull white.

58. Russet Queen (Sands), **A.M.** October 28, 1906.—Late ; plant large, vigorous, spreading, fairly erect ; tubers compact in hill ; branches many, stout, triangular, dark green, slightly tinged with reddish-brown ;

leaves large; leaflets fairly long, broad, smooth, slightly crumpled; flowers rather few, pale; tubers medium-sized elongated, regular; skin rough, rather coarsely russeted, uniform, dull brownish-white; size and shape variable; eyes rather many, scattered, large, deep, compound; eyebrows light, uniform inconspicuous, long; flesh firm, fine-grained, juicy dull white.

48. St. Patrick (Barr).—Late; plant large, very vigorous, fairly compact, erect; branches many, stout, triangular, dark green slightly tinged with reddish-brown; leaves large; leaflets long, pinnate, fairly broad, smooth rather crumpled; flowers many, large, rather dark; seed-balls numerous, fairly large; tubers medium-sized, round, regular; skin rough, coarsely russeted, dull white, a little mottled with purple; size and shape uniform; eyes many, scattered, rather small, shallow, mostly single, light, uniform, eyebrows slightly prominent, long; flesh firm, coarse-grained, fairly juicy, light dull white.

92. Satisfaction (Barr), **A.M.** September 10, 1895.—Midseason; plant large, vigorous, spreading, erect; branches few, stout, triangular, green, much tinged with reddish-brown; leaves large; leaflets long, rather narrow, smooth, flat; flowers rather pale; tubers medium-sized, round, flattened, regular; skin rough, dull white; size and shape uniform; eyes few, mostly at the apex, small, shallow, compound, rather dark, uniform; eyebrows inconspicuous, short; flesh firm, rather coarse-grained, juicy, dull white. Plants variable.

89. Schoolmaster (Barr), **F.C.C.** August 16, 1876.—Midseason or late; plant small, weak, spreading, erect; tubers compact in hill; branches few, slender, triangular, very light green slightly tinged with reddish-brown; leaves medium-sized; leaflets medium-sized, smooth, flat; flowers few, large, pale; tubers medium-sized, round, regular; skin rough, coarsely russeted, dull white; size variable, shape fairly uniform; eyes fairly numerous, scattered, medium-sized, shallow, single, light, uniform; eyebrows inconspicuous, of medium length; flesh firm, fine-grained, juicy, dull white.

78. Scot, The (Dobbie).—Late; plant large, vigorous, spreading, erect; tubers scattered; branches many, stout, triangular, rather light green slightly tinged with reddish-brown; leaves fairly large, of medium length and width, smooth, flat; flowers few, pale; tubers medium-sized, round, regular; skin rough, coarsely russeted, dull white; uniform in size and shape; eyes few, scattered, small, shallow, single, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

91. Scottish Triumph (Barr).—Late; plant large, vigorous, spreading, erect; tubers compact in hill; branches few, stout, triangular, light green slightly tinged with reddish-brown; leaves large; leaflets long, broad, rather crumpled; flowers many, large, rather dark; tubers large, elongated, regular; skin rough, coarsely russeted, dull white; size and shape variable; eyes few, mostly at the apex, small, shallow, compound, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

14, 16, 20, 24. Sharpe's Express (Barr, Sydenham, J. Veitch, Sharpe), **A.M.** August 18, 1901.—Early; plant large, vigorous, spreading, erect; tubers compact in hill; branches many, stout, triangular, light green

slightly tinged with reddish-brown; leaves large; leaflets of medium length, fairly smooth; tubers large, elongated, regular; skin smooth, finely russeted, clear white; size uniform; eyes many, prominent, light, uniform; eyebrows, prominent; flesh firm, juicy, fine-grained, clear white.

15, 23. Sharpe's Victor (Barr, Sharpe), **A.M.** August 14, 1900.—Early; plant rather small, fairly vigorous, spreading; tubers compact in hill; branches many, slender, triangular, narrowly winged, rather light green much tinged with dark brown (stem of most plants almost black); leaves large; leaflets long, fairly broad, smooth; flowers small, pale; tubers medium-sized, elongated, regular; skin smooth, dull white; size and shape uniform; eyes few, scattered, prominent, compound, uniform; eyebrows prominent; flesh firm, fine-grained, juicy, clear white.

2. Sir John Llewelyn (Barr), **A.M.** September 11, 1900.—Early; plant large, vigorous, compact, erect; tubers compact in hill; branches few, stout, triangular, dark green tinged with reddish-brown; leaves medium-sized; leaflets medium length and breadth, smooth, flat; flowers few, small, pale; tubers large, elongated, flattened; skin smooth, finely russeted, dull white; size and shape uniform; eyes fairly numerous, scattered, large, shallow, single, light, uniform; eyebrows prominent, fairly long; flesh firm, fine-grained, juicy, clear white.

44. Suffragette, The (J. McCallum).—Midseason; plant small, fairly vigorous, spreading, erect; branches many, mostly slender, triangular, rather dark green; leaves rather small; leaflets fairly long, fairly broad, shortly petioled, smooth, slightly crumpled; tubers elongated, flat; skin smooth, white; eyes few, shallow; flesh firm, juicy, white.

30. Supreme (Barr), **A.M.** September 11, 1900.—Early; plant fairly large, very vigorous, spreading, erect; tubers compact in hill; branches few, slender, triangular, dark green slightly tinged with reddish-brown; leaves rather small; leaflets long, rather narrow, smooth, slightly crumpled; flowers few, small, pale; tubers small, elongated, rather flattened, irregular; skin smooth, clear white; size and shape uniform; eyes few, scattered, fairly large, shallow, compound, very light, uniform; eyebrows inconspicuous, long; flesh firm, fine-grained, fairly juicy, dull white.

21. Syon House Prolific (Veitch), **F.C.C.** April 11, 1905.—Early; plant rather small, vigorous, fairly compact, decumbent; branches many, slender, triangular, narrowly winged, dark green; leaves rather small; leaflets short, broad, fairly smooth, crumpled; flowers few, small, pale; tubers small, intermediate between round and elongated, regular; skin rough, finely russeted, dull white; size and shape fairly uniform; eyes few, scattered, small, shallow, single, light, uniform; eyebrows inconspicuous, short; flesh firm, fine-grained, juicy, dull white.

54. Table Talk (Sands).—Late; plant very large and vigorous, fairly compact, erect; tubers compact in hill; branches few, very stout, triangular, dark green tinged with reddish-brown, the nodes deeper in colour; leaves large; leaflets long, broad, smooth, flat; flowers many, medium-sized, dark; tubers medium-sized, elongated, regular; skin smooth, finely russeted, clear white; size and shape uniform; eyes few, distributed singly, rather large, shallow, compound, light-coloured, uniform in character; eyebrows rather prominent, long, distinct in colour; flesh firm, fine-grained, juicy, dull white.

80. *Talisman* (Dobbie).—Plant fairly large, vigorous ; crop too poor for description.

49. *Weston Wonder* (Phillips).—Plant large, vigorous ; crop too poor for description.

45. *White Eye Ruddy* (J. O'Brien).—Midseason ; plant large, fairly vigorous, spreading, erect ; tubers compact in hill ; branches many, stout, triangular, light green tinged with reddish-brown, the nodes rather darker ; leaves very large ; leaflets long, broad, smooth, flat ; flowers few, pale ; tubers elongated ; skin rough, coarsely russeted, dull white variably tinged and mottled lightly with purple ; size variable ; shape fairly uniform ; eyes many, scattered, large, deep, compound, light, uniform ; eyebrows prominent, long, distinct in colour ; flesh firm, fine-grained, fairly juicy, dull white.

88. *Windsor Castle* (Barr), **F.C.C.** September 12, 1899.—Midseason ; plant fairly large, vigorous, spreading, slightly decumbent ; tubers compact in hill ; branches many, fairly stout, triangular, dark green, much tinged with dark brown ; leaves small ; leaflets of medium length and breadth, smooth, flat ; flowers few, large, pale ; tubers small, round, flattened ; skin smooth, finely russeted, clear white ; size variable ; shape fairly uniform ; eyes few, mostly at the apex, small, shallow, single, light, uniform ; eyebrows inconspicuous, short ; flesh firm, fine-grained, rather dry, dull white.

41. *Wood Green Wonder* (Worcester).—Plant large, weak, spreading, decumbent ; branches many, slender, triangular, light green ; leaves small ; leaflets short, narrow, smooth, flat ; flowers none ; tubers very small, round, regular ; skin smooth, finely russeted, dull white ; size and shape uniform ; eyes many, mostly at the apex, large, shallow, single, light, uniform ; eyebrows inconspicuous, long ; flesh rather soft, fine-grained, fairly juicy, light yellow.

40. *Yule's Success* (J. Yule, jr.).—Late ; plant large, vigorous, spreading, erect ; branches many, stout, triangular, dark green tinged with reddish-brown ; leaves medium-sized ; leaflets rather short, broad, smooth, flat ; flowers many, small, pale ; tubers medium-sized, kidney ; skin rough, coarsely russeted, dull white ; size and shape fairly uniform ; eyes fairly numerous, mostly at the apex, large, deep, compound, light, uniform ; eyebrows rather prominent ; flesh firm, fine-grained, juicy, dull white.

77. Seedling No. 9 (Bettinson).

71. Seedling No. 227 (Bettinson).

26. Seedling No. 238 (Bettinson).

72. Seedling No. 236 (Bettinson).

76. Seedling No. 808 (Bettinson).

} These varieties have not yet been
named.

TRIAL OF POTATOS FROM VARIOUS LOCALITIES.

A TRIAL of the influence of climate and soil on the crop-yielding value of seed potatoes was carried out during 1908 at Wisley. Seed was obtained from gentlemen in different districts, whose names are given in the following list, who were able to certify the locality in which it was grown. Each of these kindly sent 20 tubers of the variety 'Up to Date.' These were all planted on April 9th on good sandy loam that had previously been moderately manured. When mature the crop was lifted and weighed, the Irish seed and one of the Scotch giving the heaviest yield. The average of the whole of the stocks was 84 lb. from 20 tubers, that from Wisley (grown for one year) being rather above the average, viz. 86 lb. Practically all the produce was of good size for use, very few small tubers being produced.

Trial number	Donor	Soil in which seed had been grown	Weight of produce from 20 tubers
IRELAND.			
6	A. Black, Carton, Maynooth, Co. Kildare.	Strong and deep limestone.	110
16	W. E. Sands, Hillsborough, Co. Down.	Sharp gravelly land with clay bottom.	125
12	J. F. Williamson, Summer Hill, Mallow, Co. Cork.	Medium loam.	150
SCOTLAND.			
10	A. Kirk, Norwood Gardens, Alloa, Clackmannan.	Light sandy loam.	123
11	W. Priest, Eglinton Gardens, Kilwinning, Ayrshire.	Light sandy loam.	68
17	C Street, Floors Castle Gardens, Kelso, Roxburgh.	Heavy black soil.	56
ENGLAND, N.W., AND N. WALES.			
1	F. Clarke, Lowther Gardens, Penrith, Cumberland.	Strong loam resting on clay.	106
4	F. W. Tyler, Gisburn Park Gardens, Clitheroe, Lancs.	a. Fresh turned yellow loam on moors. b. Heavy clay; subsoil pure yellow clay.	60 84
5	W. Pilgrim, Bodorgan Gardens, Anglesey.	Medium clay.	60
ENGLAND, MIDLANDS.			
15	W. Crump, Madresfield Court Gardens, Malvern, Worcester.	Strong clay loam.	70
ENGLAND, S.W., AND S. WALES.			
2	T. Coomber, The Hendre Gardens, Monmouth.	Heavy clay.	56
9	J. Harris, Blackpill, Swansea, Glamorgan.	Strong black loam.	77
7	T. H. Slade, Poltimore Gardens, Exeter, Devon.	a. Sandy loam. b. Heavy loam.	61 78
ENGLAND, S.E.			
3	J. G. Weston, Eastwell Park Gardens, Kent.	Moderately heavy loam with chalk subsoil.	72
8	R.H.S. Gardens, Wisley, Ripley, Surrey.	Bagshot Sand, subsoil sand.	86
13	W. Mease, Downside, Leatherhead, Surrey.	Chalk.	60

BEETS AT WISLEY, 1908.

FIFTY-SEVEN stocks of Beets were sent to the Garden for trial. Nearly all the stocks germinated well, and made excellent and healthy growth, and in only a few instances were the stocks mixed. The Fruit and Vegetable Committee examined the collection on three occasions, for the early, mid-season, and late varieties.

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| *1. Cheltenham Green-top. | 29. Globe, improved. |
| 2. Crimson Globe, Carter's. | 30. Dwarf Red, Nutting's. |
| 3. Dwarf Purple-top, Cattell's. | 31. Exhibition, Pragnell's. |
| 4. Northumberland, Dewar's. | 32. Red, Veitch's selected. |
| 5. Dwarf Red, Carter's. | 33. Purple, Dobbie's. |
| 6. Dark Red Globe, Carter's. | 34. Superb Red, Dobbie's. |
| 7. Egyptian Turnip-rooted, Carter's re-selected. | 35. Globe, Dobbie's selected. |
| 8. Early Blood Turnip, Carter's. | 36. Willow-leaved, Dobbie's. |
| 9. Blood Red, Carter's large. | 37. Blood Red, Sutton's. |
| 10. Dwarf Red, Nutting's. | 38. Globe, Sutton's. |
| 11. Perfection, Carter's. | 39. Green-top, Sutton's. |
| 12. Pine Apple Short-top, Carter's. | 40. Pine Apple, Sutton's. |
| 13. Eclipse, or New Early Model Globe. | 41. Cheltenham Green-top. |
| 14. Cheltenham Green-leaved. | 42. Best of All, Sharpe's. |
| 15. Exhibition, Pragnell's. | 43. Crimson, Dell's. |
| 16. Delicacy. | 44. Dark-leaved Globe, Johnson's. |
| 17. Cheltenham Green-top. | 45. Globe, Sutton's. |
| 18. Covent Garden, Barr's. | 46. Red, Nutting's selected. |
| 19. Dark-leaved Globe, Barr's. | 47. Black-leaved, Dell's selected. |
| 20. Crimson-leaved, Dell's. | 48. Superb Red, Veitch's. |
| 21. Early Globe, Barr's improved. | 49. Perfection, Lockyer's. |
| 22. Blood Red, Barr's fine selected. | 50. Black Queen. |
| 23. Dwarf Red, Nutting's. | 51. Covent Garden Red. |
| 24. Pine Apple. | 52. Black-leaved, Dell's. |
| 25. Exhibition, Pragnell's. | 53. Eclipse. |
| 26. Dwarf Crimson, Barr's selected. | 54. Egyptian Turnip-rooted. |
| 27. Cheltenham Green-top. | 55. Blood Red, long smooth. |
| 28. Crimson, Dell's. | 56. Dwarf deep blood red, Nutting's improved. |
| | 57. Strasburg Pear-shaped. |

42. Best of All, Sharpe's (Sharpe).—Root large, long conical ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones and very little core ; 15 per cent. of the root above the soil ; plant large, many leaved, with vigorous spreading growth ; leaves large, long, broad, smooth, crumpled, dark green a little tinged with purple.

52. Black-leaved, Dell's (Rouge naine de Dell) (Vilmorin).—Root very small, long conical ; skin smooth, a little russeted at the top ; flesh dark

* See footnote, p. 525.

with distinct light zones and very little core ; root quite buried ; plant very small, many leaved, with weak spreading growth ; leaves small, narrow, smooth, plain surfaced, green much tinged with purple.

47. Black-leaved, Dell's selected (Nutting).—Root small, long conical ; skin smooth, a little russeted at the top ; flesh dark with distinct light zones and very little core ; 5 per cent. of the root above the soil ; plant small, few leaved, with weak spreading growth ; leaves small, short, smooth, crumpled, dark purple.

50. Black Queen (Reine des Noires) (Vilmorin).—Root large, long turnip-shaped ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones and very little core ; 5 per cent. of the root above the soil ; plant large, few leaved, with vigorous upright growth ; leaves large, long, broad, smooth, crumpled, dark.

22. Blood Red, Barr's fine selected (Barr).—Root large, long conical ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones and not much core ; 5 per cent. of the root above the soil ; plant large, many leaved, with vigorous upright growth ; leaves long, broad, smooth, plain surfaced, dark purple.

9. Blood Red, Carter's large (Carter).—Root large, long conical ; skin, smooth, a little russeted ; flesh dark, with distinct light zones and very little core ; 20 per cent. of the root above the soil ; plant large, many leaved, with vigorous upright growth ; leaves large, long, broad, smooth, plain surfaced, dark.

55. Blood Red, long smooth (Rouge grosse or Rouge longue) (Vilmorin). Root small, long conical ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones ; 5 per cent. of the root above the soil ; plant large, many leaved, with vigorous upright growth ; leaves long, broad, smooth, plain surfaced, dark green tinged with purple.

37. Blood Red, Sutton's (Sutton).—Root small, long conical ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones and medium-sized core ; plant small, many leaved, with vigorous spreading growth ; leaves long, broad, smooth, plain surfaced, dark green tinged with purple.

Cattell's. See Dwarf Purple-top, Cattell's.

14. Cheltenham green-leaved (Sydenham). See Cheltenham Green-top.

1, 14, 27. Cheltenham Green-top (Carter, Sydenham, J. Veitch). **A.M.** September 17, 1896.—Root large, long conical ; skin smooth, a little russeted at the top ; flesh dark, with distinct light zones and very little core ; 20 per cent. of the root above the soil ; plant large, many leaved, with vigorous spreading growth ; leaves small, short, smooth, plain surfaced, dark green a little tinged with purple.

17. Cheltenham Green-top, Barr's selection (Barr).—Points of difference from the type : root small ; flesh dark, slightly zoned, with not much core ; plant small ; leaves many ; 10 per cent. of root above the soil.

41. Cheltenham Green-top, Sharpe's selected (Chas. Sharpe).—Points of difference from the type : root fairly large ; 5 per cent. of root above the soil ; leaves many, large, long, broad, rather rough surfaced, green very lightly tinged with purple.

18. Covent Garden, Barr's (Barr).—Root small, long conical; skin smooth, very slightly russeted at the top; flesh dark with distinct light zones and not much core; 5 per cent. of the root above the soil; plant large, many leaved, with vigorous upright growth; leaves small, short broad, smooth, plain surfaced, variable in colour.

51. Covent Garden Red (Rouge de Covent Garden) (Vilmorin).—Points of difference from the above: core of root large and distinct; plant-growth spreading; leaves medium sized, long, narrow, green lightly tinged with purple.

20, 28. Crimson (Crimson-leaved), Dell's (Barr, J. Veitch).—Root of medium size, long conical; skin smooth, a little russeted at the top; flesh dark crimson tinged lightly with purple, with distinct light zones and very little core; 5 per cent. of the root above the soil; plant small, leaves many, growth vigorous and spreading; leaves small, short, broad, smooth, plain surfaced, dark.

43. Crimson, Dell's, Sharpe's selected (Chas. Sharpe).—Points of difference from the type: root small; 10 per cent. of root above the soil; growth moderate, upright; leaves narrow, crumpled surface.

2. Crimson Globe, Carter's (Carter).—Root small, nearly globular with small abrupt tap-root; skin smooth, much russeted at the top; flesh light coloured with distinct light crimson zones and distinct core; 33 per cent. of the root above the soil; plant large, few leaved with vigorous spreading growth; leaves small, short, smooth, with slightly crumpled surface, dark green veined with purple.

19. Dark-leaved Globe, Barr's (Barr).—Root small, nearly globular, with small, not abrupt, tap-root; skin smooth, much russeted at the top; flesh dark with distinct light zones and very little core; 33 per cent. of the root above the soil; plant large, few leaved, with vigorous upright growth; leaves long, broad, smooth, plain surfaced, dark green much tinged with purple.

44. Dark-leaved Globe, Johnson's (Johnson).—Points of difference from the last: root core large and distinct; plant large, leaves many, growth vigorous spreading; fifteen per cent. of the root above the soil.

6. Dark Red Globe, Carter's (Carter).—Root large, nearly globular, with large but abrupt tap-root; skin rough, much russeted; flesh with distinct light crimson zones; 33 per cent. of the root above the soil; plant large, many-leaved, with vigorous upright growth; leaves short, smooth, crumpled surface, pale purple with darker veins.

16. Delicacy (Beckett).—Root large, long conical; skin smooth, lightly russeted at the top; flesh dark with very slight dark zones and very little core; 15 per cent. of the root above the soil; plant small, leaves many, with vigorous upright growth; leaves large, long, broad, smooth, plain surfaced, dark green slightly tinged with purple.

Dell's Black-leaved. See Black-leaved, Dell's.

26. Dwarf Crimson, Barr's selected (Barr).—Root small, long conical; skin smooth, a little russeted at the top; flesh dark with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant large, many-leaved, with vigorous upright growth; leaves long, broad, smooth, plain surfaced, dark purple.

56. Dwarf deep blood-red, Nutting's improved (Rouge naine très

foncé) (Vilmorin).—Root small, long conical; skin smooth, a little russeted at the top; flesh dark with distinct light zones and very little core; 5 per cent. of the root above the soil; plant small, many-leaved, with vigorous spreading growth; leaves long, broad, smooth, plain surfaced, dark green much tinged with purple.

8. Dwarf Purple-top, Cattell's (Carter).—Root small, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and medium-sized core; 25 per cent. of the root above the soil; plant small, leaves many, with vigorous spreading growth; leaves long, broad, smooth, plain surfaced, dark purple.

5. Dwarf Red, Carter's (Carter).—Root small, long conical; skin smooth, slightly russeted at the top; flesh dark, with distinct light zones and very little core; 25 per cent. of the root above the soil; plant small, few leaved, with weak spreading growth; leaves small, short, narrow, smooth, plain surfaced, dark.

28, 10, 80. Dwarf Red, Nutting's (Barr, Carter, J. Veitch), **A.M.** September 17, 1896.—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and not much core; 5 per cent. of the root above the soil; plant large, many-leaved, with vigorous spreading growth; leaves with plain surface, dark purple. Identical with 46, Red, Nutting's selected.

8. Early Blood Turnip, Carter's (Carter).—Root small, nearly globular, with small abrupt tap-root; skin smooth, much russeted at the top; flesh dark, with distinct light zones and very little core; 88 per cent. of the root above the soil; plant large, few leaved, with vigorous upright growth; leaves long, broad, smooth, plain surfaced, dark purple.

21. Early Globe, Barr's improved (Barr).—Root small, nearly globular, with small abrupt tap-root; skin smooth, russeted; flesh dark, with distinct light zones and large distinct core; 88 per cent. of the root above the soil; plant small, few leaved, with weak spreading growth; leaves small, short, narrow, smooth, plain surfaced, dark green a little tinged with purple.

18. Eclipse, or New Early Model Globe (Sydenham).—Root small, nearly globular, with small abrupt tap-root; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and very little core; 88 per cent. of the root above the soil; plant small, few leaved, with upright growth; leaves small, short, smooth, plain surfaced, dark.

58. Eclipse (dark red turnip, very early) (Vilmorin).—Root large, nearly globular, with small abrupt tap-root; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and large distinct core; 20 per cent. of the root above the soil; plant medium-sized, leaves few with spreading growth; leaves long, broad, smooth, plain surfaced, dark green a little tinged with purple.

54. Egyptian Dark Red Flat Extra Early (Rouge noir plate d'Egypte) (Vilmorin). **A.M.** September 17, 1896.—Root small, globular, much flattened at the top and bottom with small abrupt tap-root; skin smooth, much russeted at the top; flesh dark, with distinct light zones and medium-sized core; 88 per cent. of the root above the soil; plant small, few leaved, with weak spreading growth; leaves small, short, narrow, smooth, plain surfaced, dark green slightly tinged with purple.

7. Egyptian Turnip-rooted, Carter's re-selected (Carter).—Root small, nearly globular, but flattened at the top and bottom, with small abrupt tap-root; skin smooth, much russeted; flesh dark, with distinct light zones and very little core; 83 per cent. of the root above the soil; plant small, with weak spreading growth; leaves small, short, narrow, smooth, with slightly crumpled surface, light green a little tinged with purple.

25, 15, 31. Exhibition, Pragnell's (Barr, Sydenham, J. Veitch).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant many leaved, with vigorous upright growth; leaves large, long, broad, smooth, plain surfaced, dark green much tinged with purple.

29. Globe, improved (J. Veitch).—Root small, nearly globular, with small abrupt tap-root; skin smooth, much russeted at the top; flesh dark with distinct light zones and very little core; 83 per cent. of the root above the soil; plant large, few leaved, with vigorous upright growth; leaves long, broad, smooth, plain surfaced, dark green lightly tinged with purple.

35. Globe, Dobbie's selected (Dobbie).—Root small, nearly globular, much flattened at the top; with small abrupt tap-root; skin smooth, much russeted at the top; flesh dark with distinct light zones and large distinct core; 83 per cent. of the root above the soil; plant large, with vigorous upright growth; leaves large, long, broad, smooth, plain surfaced, dark green lightly tinged with purple.

45, 38. Globe, Sutton's (Johnson, Sutton), **A.M.** July 31, 1908.—Root small, nearly globular, with small abrupt tap root; skin smooth, much russeted at the top; flesh dark, with distinct light zones, and medium-sized core; 83 per cent. of the root above the soil; plant small, few leaved, with rather weak spreading growth; leaves small, short, broad, smooth, plain surfaced, dark green lightly tinged with purple.

39. Green-top, Sutton's (Sutton).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant many leaved, with vigorous spreading growth; leaves short, broad, rough, crumpled surface, dark green lightly tinged with purple.

Lockyer's. See Perfection, Lockyer's.

4. Northumberland, Dewar's (Carter)—Root large, long conical; skin smooth, slightly russeted at the top; flesh light coloured, with distinct zones and medium-sized core; 15 per cent. of the root above the soil; plant small, growth weak and spreading; leaves small, short, smooth, plain surfaced, dark green lightly tinged with purple.

Perfection Dwarf Red (Hurst), received **A.M.** September 17, 1896.

11. Perfection, Carter's (Carter).—Root large, long conical; skin smooth, russeted lightly at the top; flesh dark, with distinct light zones and very little core; 20 per cent. of the root above the soil; plant small, many leaved, with weak spreading growth; leaves short, narrow, smooth, plain surfaced.

49. Perfection, Lockyer's (Searle).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant

small, few leaved, with upright growth; leaves rather small, short, narrow, smooth, crumpled surface, dark.

24. Pine Apple (Barr).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zone and medium-sized core; 5 per cent. of the root above the soil; plant large, many leaved, with vigorous upright growth; leaves long, broad, smooth, plain surfaced, dark green lightly tinged with purple.

40. Pine Apple, Sutton's (Sutton), **A.M.** September 29, 1908.—Points of difference from the last: growth spreading; 10 per cent. of the root above the soil.

12. Pine Apple Short-top, Carter's (Carter).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and very little core; 15 per cent. of the root above the soil; plant large, with upright growth; leaves large, broad, smooth, plain surface, dark. Few points of difference from 24, Barr's var.

Pragnell's. See Exhibition, Pragnell's.

38. Purple, Dobbie's (Dobbie).—Root large, long conical; skin smooth, a little russeted at the top; flesh very dark, with distinct dark zones and medium-sized core; 10 per cent. of the root above the soil; plant large, many leaved, with vigorous upright growth; leaves large, long, broad, smooth, plain surfaced, dark green slightly tinged with purple.

46. Red, Nutting's selected (Nutting).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant large, leaves many, with vigorous spreading growth; leaves short, narrow, smooth, crumpled surface, dark green much tinged with purple. (See Drawf Red, Nutting's.)

32. Red, Veitch's selected (J. Veitch).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and very little core; $7\frac{1}{2}$ per cent. of the root above the soil; plant of medium size, many leaved, with vigorous spreading growth; leaves long, broad, smooth, plain surfaced, dark green a little tinged with purple.

Sharpe's. See Best of All, Sharpe's.

57. Strasburg Pear-shaped (Rouge piriforme de Strasbourg) (Vilmorin).—Root large, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and very little core; 5 per cent. of the root above the soil; plant large, few leaved, with vigorous upright growth; leaves large, long, broad, smooth, crumpled surface, dark.

34. Superb Red, Dobbie's (Dobbie).—Root large, long conical; skin smooth, a little russeted at the top; flesh light, with distinct zones and large distinct core; 5 per cent. of the root above the soil; plant medium sized, many leaved, with vigorous spreading growth; leaves long, broad, smooth, plain surfaced, dark green a little tinged with purple.

48. Superb Red, Veitch's (R. Veitch).—Points of difference from the last: flesh dark, plant large, growth upright.

36. Willow-leaved Dobbie's (Dobbie), **A.M.** for ornamental foliage; September 29, 1908.—Root small, long conical; skin smooth, a little russeted at the top; flesh dark, with distinct light zones and medium-sized core; 5 per cent. of the root above the soil; plant small, many leaved, with weak spreading growth; leaves small, long, narrow, smooth, plain surfaced, dark green much tinged with purple.

REPORT ON MISCELLANEOUS VEGETABLES AT WISLEY, 1908.

BROCCOLI.

'Snow Queen' (Deal).—Plant of moderate size; compact habit; medium-sized foliage; heads of fair size, with a very close white curd.

BEAN.

1. 'Dwarf Bush' (Stark).—A very prolific variety with medium-sized pods. Raised from 'Burpee's Bush' × 'Magnum Bonum.' Intermediate in character between these two French Beans.

2. 'Exhibition Longpod' (Bunyard).—A very fine variety of the Longpod Broad Bean. A variety under this name from Messrs. R. Veitch received an Award of Merit, July 1, 1897.

3. 'Kentish Invicta Prize Scarlet Runner' (Bunyard).—A strong, vigorous variety, producing very long, thick, fleshy, straight pods of a bright-green colour in good clusters. A very fine, handsome variety.

4. 'Leviathan White Longpod,' A.M. June 30, 1908 (Carter).—Pods of great length and freely produced. An excellent variety for home use or exhibition. A seedling, No. 255, sent by the same firm was decided to be identical with the above.

5. 'Perpetual Dwarf French,' A.M. July 31, 1908 (Carter).—A compact growing French Bean, producing great crops of medium-sized pods, straight, of a dark-green colour, and bearing for a long period.

6. 'Robin Hood Longpod' (Harrison).—A distinct variety with long, handsome pods. Abundant bearer.

7. 'Scarlet Emperor' (Carter).—A very large variety, resembling No. 3.

CALABASH (Hayman).

These were not a success. Evidently our summers are not hot enough for them in the open.

DOLICHOS LAB-LAB SOUDANENSIS (Dammann).

No improvement on other varieties in cultivation.

LETTUCE.

1. 'Brittle Ice' (Burpee).—A very large, coarse, spreading variety, with a large heart.

2. 'New Excelsior' Cabbage (Harrison).—This scalded so badly as to be of little value.

3. 'Wayahead' (Burpee).—An excellent little Cabbage variety of the 'Tom Thumb' type, coming quickly into use, and standing well without running to seed.

MELON.

1. 'Brûde de Poche' (Hindmarsh).—A scarlet-fleshed variety of medium size, pale in colour, not much netted; flesh melting, and of

a peculiar musky flavour. A very free setter, and of the Cantaloupe type.

2. 'Worth Hall Favourite' (Edwards).—A very large, handsome variety of good colour and coarsely netted; flesh scarlet, thick, juicy or melting, and of fair flavour. A vigorous grower and free setter.

ONION.

1. 'Early Rose' (Burpee).—Seeds received too late.

2. 'Early Wonder' (Carter).—Seeds received too late.

PEACH VINE (Richardson).

A plant of vegetable marrow-like growth showing no signs of fruiting.

RADISH.

1. 'Early Favourite' (Carter).—A pretty little round variety with a short top, maturing very early.

2. 'Scarlet Globe' (Harrison).—A small round variety, very quickly coming into use.

TOMATO.

All grown in the open air.

1. 'Chalk's Early Jewel' (Burpee).—Not a success in the open.

2. 'Coreless Scarlet' (R. Veitch).—Not a success in the open.

3. 'Giant Pear' (Dammann).—Not a success in the open.

4. 'Lye's Early Prolific,' **A.M.** August 25, 1908 (Wadds).—The award was given to this as an outdoor variety. Fruits of medium size, smooth, bright red, borne in large clusters; plant sturdy and a great cropper.

5. 'Spark's Earliana' (Burpee).—Not a success in the open.

6. 'Merveille des Marches' (Hindmarsh).—Plant vigorous, fruit large, inclined to corrugate; scarlet. A good cropper.

MISCELLANEOUS REPORT ON FLOWERING PLANTS AT WISLEY, 1908.

AGERATUM.

'Mauve Beauty' (J. Veitch).—An unfixed strain. A large proportion of dwarf-habited plants (6 inches) with dense compact heads of bloom, but a considerable number of taller plants (1 foot) with looser habit.

ASTER (*Callistephus*).

Hohenzollern Asters (J. Veitch).—Good strains, true to name, were received in the following colours—azure blue, dark blue, light blue, brilliant carmine, carmine rose, rose, rosy-lilac and white. Flowers 3 to 4 inches in diameter, habit good, height $1\frac{1}{2}$ feet.

'Sada Yakko' (Dammann).—An especially good variety; flowers soft pink, 3 to 4 inches in diameter, very double, freely borne on stout stalks, lasting well. $1\frac{1}{2}$ feet.

BEGONIA.

dichroa (R. Veitch).—Leaves long, ear-shaped, spotted with silver: not yet flowered.

semperflorens 'rose' (J. Veitch).—A useful plant but not found different in colour from the type commonly grown.

semperflorens 'compact rose' (J. Veitch).—Similar to the last.

'Superb Prize Double' (Sydenham).—Tuberous rooted, mixed colours.

BRACHYCOME.

iberidifolia 'Snow Star' (J. Veitch).—A pure white form, free and continuous flowering, of the Swan River Daisy.

CALLIOPSIS.

'Tom Thumb Beauty' (J. Veitch).— $1\frac{1}{2}$ feet.

CANDYTUFT.

'Snow Queen' (Deal).—Highly commended (**XXX**), July 30, 1908.

CARNATION.

'Bright Scarlet' (Bowers, 1907).—Rosy-scarlet, very bad calyx.

'Large dark crimson' (Bowers, 1907).—Scented and with good calyx, but stems too weak and flowers too thin to prove of value.

'Giant Chaband' (Dammann).—A fine strain, best raised annually from seed. Flowers rather thin in substance but very freely borne, continuing in full bloom till prevented from opening by the frost.

CELOSIA.

'Magnificent' (Burpee).—A poor strain, very variable in habit. Flowers yellow, orange, crimson, 1-2 feet.

CLEOME.

gigantea (Dammann).—Seeds received under this name proved to be *C. spinosa*.

spinosa (R. Veitch).—An interesting tender annual. Flowers magenta rose in large terminal racemes. Leaves of 5 to 7 digitately disposed, clammy, spiny leaflets : stems prickly, 2-8 feet.

COSMOS.

bipinnatifida praecox rosea laciniata (R. Veitch).—Flowering late.

Early-flowering mixed (Dammann).—Flowering in August from seed sown April 14, 4-5 feet.

'Red Star' (Dammann).—Just commencing to flower when cut by frost at the end of October, 6½ feet.

Roemer's early and large flowering (Roemer).—The best of the strains received, flowering freely in August from seed sown May 9, in three colours, crimson, rose and white, 4 feet.

Veitch's early-flowering (R. Veitch).—Mixed colours, white, pink, &c., not free flowering, 5 feet.

DAHLIA.

Giant Semi-double (R. Veitch).—Flowers large and coarse, of mixed colours and shades ; maroon, scarlet, pink, &c.

ESCHSCHOLZIA.

erecta compacta 'Dainty Queen' (J. Veitch).—Pale salmon-pink, not free-flowering.

Mandarin compacta (J. Veitch).—Deep orange, free.

GAILLARDIA.

Veitch's Compact Strain (R. Veitch).—Not a fixed strain, the plants proving variable in height and habit.

GAZANIA.

hybrida grandiflora (Dammann).—Not found finer flowered than the common *G. splendens*.

GODETIA.

'Duchess of Albany,' improved (Dobbie).—Not found different from the old variety ; white, 2 feet.

'Dwarf compact Crimson Glow' (J. Veitch).—Crimson, 1 foot.

Schamini fl. pl. (Sydenham).—Flowers double, pink, free and lasting. Received A.M. in 1905.

LARKSPUR.

'Empress Carmine' (J. Veitch).—Flowers double, carmine-rose, lasting, free, 4 feet. Received A.M. at the Gardens in 1907.

MIGNONETTE.

'Golden Queen' (Sydenham).—Scented, 1 foot.

MONTHRETIA (*Tritonia*).

'Prometheus' (Wallace).—This is the finest of Mr. Davison's hybrids. Flowers deep orange with red disc, over 8 inches in diameter, 8 feet. Received A.M. in 1905.

MORNING GLORIES (*Ipomaea*).

Varieties of this pretty annual *Convolvulus* were received under the names of 'Kuni-no-tomo' and 'Yamato-gakura' (Peake), but blue and white flowers were derived from the same seed packet.

NEMESIA.

hybrida 'Blue Gem' (J. Veitch).—A little further selection will make this a very pretty strain. Most of the plants were erect habited and flowered profusely; flowers forget-me-not blue, $\frac{1}{2}$ inch in diameter. The pinkish reverse of the petals detracts from their beauty.

NICOTIANA.

affinis hybrida (Dammann).—Flowers mostly white, a few dull purple—a poor strain.

PEA.

Anson's (Carpenter).—Under this name the bright blue annual *Lathyrus sativus* var. *azureus* was received; but Anson's Pea is a fine perennial species, *L. magellanicus*.

Sweet Peas (Dobbie).—Fifty varieties were sown in November 1907, to ascertain whether autumn sowing on light soil affected the quality of the bloom and the duration of the flowering period, but the stocks came through the winter and spring in such a sorry condition that, together with other stocks (spring-sown) from Miss Hemus, Hugh Aldersey and Messrs. W. Atlee Burpee, they were uprooted and replaced by other subjects.

PETUNIA.

hybrida grandiflora fimbriata flore-pleno 'Concordia,' self-seeding (Roemer).—A mixed strain; one double white was raised.

SALVIA SPLENDENS (from seed).

'Lord Fauntleroy' (R. Veitch).—Uniform in height, free flowering. 15 inches.

'Scarlet Dragon' (R. Veitch).—Inflorescence poor, 2½ feet.

'Zurich' (J. Veitch).—An unfixed strain, the plants raised varying in height from 9 inches to 3 feet.

SHASTA DAISY.

'California' (Dammann).—Not found superior to the type, *Chrysanthemum maximum*.

STOCK, VICTORIA.

'Salmon Rose' (Dammann).—Plants of a uniform and pleasing shade of pink, with but a small percentage of doubles.

TROPAEOLUM (*Nasturtium*).

Dwarf 'Crystal Queen' Tom Thumb (Burpee).—Foliage pale green, much peppered with white; flowers pale yellow. Dwarf and compact, 9 inches. Many rogues.

Dwarf 'Golden Midnight' (Burpee).—Foliage uniform yellow-green contrasting with the dark self crimson flowers; habit spreading, 18 inches.

Dwarf Queen 'Lady Bird' (Burpee).—Foliage pale green, much peppered with white; flowers yellow, blotched at the base of the blade of the petal with maroon, rather buried: habit spreading, 15 inches. A few rogues.

'Flamingo,' ivy-leaved (Sydenham).—Tall, flowers scarlet, the notched petals and variable slightly lobed leaves showing the influence of *T. Lobbianum*. Several rogues.

'Golden Gem,' ivy leaved (Sydenham).—Tall, flowers self-yellow, foliage variably lobed.

Queen 'Crimson Beauty' (J. Veitch).—Tall, foliage generally variegated with pale yellow, flowers generally light crimson.

Tall 'Crystal Queen' (Burpee).—Foliage variegated with pale yellow, flowers pale yellow, deep yellow, orange, salmon, &c., blotched and unblotched.

Tall 'Orange Queen' (Burpee).—Foliage light or dark green or variegated; flowers pale yellow, deep yellow, scarlet or crimson.

Tall 'Variegated Queen' (Burpee).—Foliage peppered with pale yellow; flowers mostly maroon crimson.

VERBENA.

hybrida compacta 'Rosamund' (R. Veitch).—Failed to germinate.

ZEAL.

japonica gigantea quadricolor (Dammann).—Highly commended (XXX), September 4, 1908. A vigorous maize, 4 to 6 feet, the foliage more or less variegated with white, yellow, pink and crimson.

REPORT ON MANURES, APPLIANCES, &c., 1908.

1. Banding-grease and Bands (McDougall).—Both the bands and the grease proved excellent. The paper bands lasted well, and the grease remained sticky for over two months, and did not run during the hot weather experienced in October.

2. Banding-grease and Bands (Voss).—A fairly good preparation, but inclined to run during the hot weather in October. The bands were very good.

3. Charteras Patent Seed and Plant Protector (Pinches).—This would be a capital seed protector, especially for peas or similar plants in rows, but the black threads become entangled, and do not work easily through the apparatus.

4. Cultivon (Read, Blunden).—This is a black, charred material of different grades of fineness, and stated to be a manure, and also a disease arrester; but we did not find it of any particular value.

5. Frame Light (Harringer).—This is described as "Luckan's Patent Frame Light," and made of metal; but we have failed to find it in any way superior to the ordinary frame light.

6. Hand Hoe (Pearson).—A most useful little hoe for working amongst small seeds or plants or on the rockery, and to be recommended for use in any garden.

7. Hop Manure (Wakeley).—A very serviceable manure for pot fruit trees, on which it was chiefly used with good results.

8. Nico-soap (Campbell).—An excellent insecticide if used according to directions, killing aphids, thrips, or red spider, without any injury to the foliage.

9. Pix Compo (Pillinger).—A dressing for wheat to prevent the seed being destroyed by birds. A very good preparation.

10. Phospho-Nicotyl (Voss).—A preparation for destroying wood-lice, for which it answers very well.

11. Porcelain Labels (Kissling).—These labels are made in various shapes and sizes, and make very conspicuous labels for trees, shrubs, or other plants.

12. Propagating Tray (Nicholls).—A very useful tray for raising large quantities of plants. The tray is made of metal, with movable squares, into which small plants are pricked out singly, and when the plants are required they may be easily taken out after removing the side of the square, with no injury to the roots.

13. Screw Pegs or Stakes (Acme Chemical Company).—These are metal stakes in the form of a screw, and proved excellent for securing chrysanthemums, carnations, &c. They are firm in the soil, and, being painted green, are scarcely visible.

14. Sweet Pea Manure (Voss).—The season was too hot and dry at Wisley to say definitely what the value of this manure is.

15. Winter Spray for American Blight (Bunyard).—Wherever this preparation came in contact with American blight it proved deadly to this pest. It is a perfectly safe spray.

16. Winter Spray (Voss).—A wash for cleansing trees of lichen and destroying pests, &c., on the trees. It acted fairly well.

17. Woburn Paraffin Emulsion (Voss).—This wash seemed too powerful at the strength recommended.

18. Wood Oil (Boor).—This is an oily extract from wood, and is made in Sweden. It preserves the wood, without in any way discolouring it, and causes the "grain" to be more marked.

19. Wonderful Fertiliser (Voss).—A very good all-round manure.

20. Vaporiser (Voss).—An ingenious little apparatus for producing sulphur fumes to kill mildew, with no risk of burning.

21. Horticultural Hygrometer (Negretti & Zambra).—No meteorological question is of greater interest to the gardener than that of forecasting night frosts. It has been stated that the minimum temperature recorded on any night is an approximation to the dew-point temperature of the preceding evening, and that, consequently, the likelihood of frost occurring during the night can be ascertained by observing whether the evening dew-point temperature is above or below 32° F. Actually, the minimum reading on the grass is generally lower than the dew-point. Indeed, while frost may be expected with certainty if the dew-point temperature be 32° F. or less, it may also occur however hot the preceding day and with an evening dew-point much above 32° F. provided the sky be very clear. Radiation on a brilliant night may cause a rapid fall of surface-temperature from 60° at 9 P.M. to 30° before sunrise. Messrs. Negretti & Zambra have introduced a simply designed rust-proof instrument, containing wet and dry bulb thermometers and a central revolving drum graduated to indicate the probability of approaching frost, the method of graduation being based on a long series of observations, and the readings requiring no calculation on the part of the observer. The lowest (black) section of the drum, including all cases when the dew-point temperature is 32° or less, indicates "frost may be probable." The topmost (white) section indicates "frost highly improbable." An intermediate (shaded) band, occupying an increasing proportion of the area of the drum as the difference between wet and dry bulb readings increases, indicates "frost doubtful." The instrument was tested at various hours on a long series of evenings, but very seldom gave a different forecast for the night from that likely to be given by the average gardener observing the brilliance of the sky and the degree to which it was overcast, and the direction of the wind. Unfortunately a change of weather is as little foreseen by the thermometer as by the observer, and the instrument is of no value in forecasting changes of weather similar to the following. On the evening of November 5, with a dull, overcast sky and a very light easterly wind, almost calm, the minimum for the evening was reached at 7 P.M., when a self-recording thermometer in a screen one foot above the surface of the ground registered 42.7° F. At 11.15 P.M. the dry bulb of the horticultural hygrometer (exposed) read 46°, the wet bulb 45°, and the radiation thermometer on the grass gave the minimum reading 36° from earlier

in the evening. The appearance of the sky and the readings of the instrument both indicated frost extremely unlikely. The temperature steadily rose till midnight, when 44° was registered in the screen, and as steadily declined to 48.5° at 2 A.M.; but the sky then clearing, a steady and rapid fall took place till the minimum was reached between 6 and 7 A.M., when 84° was registered in the screen and 28.4° on the grass.

22. Four Oaks Undentable Syringes (Four Oaks Company).—These are made in various sizes, suitable for coarse or fine spraying, and are excellent in all respects. We do not know of any syringes that will stand rough usage so well as these.

23. Four Oaks Knapsack Sprayer (Four Oaks Company).—Consists of a copper container of the usual form and size, but has all the working parts outside, so that they are easily reached in case attention is needed. The working parts are very strong, and a considerable pressure may be maintained with a minimum of labour. The nozzle and brass tube carrying it are connected with the pump either by a rubber tube or by flexible metallic tubing. The nozzle gives a very fine spray. Two- and three-way nozzles are also provided, but the single seems to give the best results.

24. Four Oaks Spraying Machine (Four Oaks Company).—This, like the preceding, is a strong and serviceable machine. It consists of a stout wooden container, mounted on a carriage with broad wheels, and fitted with a powerful pump, which is capable of supplying two spraying tubes. The pump drives out the liquid with great force. An efficient agitator is fitted, the pump handle actuating the agitator as well. The working parts are of brass, simple and strong and easy of access. The nozzles are interchangeable with those of the knapsack sprayer, and may be placed at the end of a long, light, hollow bamboo tube, by means of which the highest orchard trees may be reached, or on the shorter tubes which are provided.

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LABORATORY AND GARDENS AT WISLEY DURING THE YEAR 1908.

- ACME CHEMICAL Co., Tonbridge, Kent. Screw pegs or stakes. See p. 551.
- ADDY, Dr. B., Weybridge. *Achimenes* tubers. Flowered at the Garden, and will be distributed to Fellows, 1909.
- ALDERSEY, H., Aldersey Hall, Chester. Sweet Peas. See p. 549. *Phlox decussata* vars. Will be reported upon in 1909.
- ALIAN, W., Gunton Park Gardens, Norwich. Raspberry 'Alexandra.' For trial in 1909.
- ARNOLD, Mrs., Dedham. Apple 'D'Arcy Spice.' Planted in the collection.
- AWCOCK, P. B., Englefield Green. Seed of *Ceanothus* and cuttings of tree Carnations.
- BAKER, MESSRS., Codsall, Staffs. Dahlias. See p. 291.
- BARR, MESSRS., Covent Garden. Varieties of beet (p. 539) and potato (p. 525), and asparagus, Brussels sprouts, cabbage, parsley, and *Phlox decussata* (trials in progress). Collection of Narcissus. Planted in the Garden. Seeds of 'Blue Poppy from Kashmir,' and *Tricuspidaria hexapetala*. Will be tried in the Garden.
- BASHAM, J., Bassaleg, Mon. Apple 'Tamplin.' Planted in the collection.
- BAXTER, W., Woking. Dahlias. See p. 291.
- BECKETT, E., Aldenham House Gardens, Elstree. Beet. See p. 539.
- BETTINSON, J., Wisbech. Potatos. See p. 525.
- BIRKBECK, Miss A. M., Putney, S.W. Seeds from Jamaica, Chili, &c. A few plants raised.
- BLACK, A., Carton Gardens, co. Kildare. Potato 'Up-to-Date.' See p. 538.
- BLUNDEN, MESSRS., Deodar Road, Putney, S.W. 'Cultivon.' See p. 551.
- BONAVIA, Dr., Worthing. Delphinium seed. Plants raised for distribution to Fellows, 1909.
- BOON, L. G., Weybridge. Wood oil. See p. 552.
- BOOTH, Mrs. M. H., Kettering. Potato. See p. 525.
- BOTTOMLEY, Prof. W., London, 'Nitro-Bactérine.'
- BOURNE, R. W., Bishopstoke. Seeds from Straits Settlements. Germinated, but mostly of little value for garden purposes.
- BOWLES, E. A., Waltham Cross. Collection of *Viola* spp. Planted in the Garden.
- BOX, J. R., West Wickham. *Chelidonium*, *Erodium*, *Horminum*, and *Vancouveria*. Planted in the Garden.
- BOXALL, Dr., Dorking. Yellow foxgloves. Planted in the Garden.
- BRODIE OF BRODIE, Brodie Castle, N.B. Seed of *Gladiolus primulinus*. Plants raised and growing in the Garden.
- BROUSSON, H. L., New Eltham, S.E. Dahlia. See p. 291.
- BROWN, W. & J., Peterborough. Potato. To be tried in 1909.
- BROWNE, THOMPSON, MESSRS., Cork. Broccoli. To be tried in 1909.
- BRYAN, Major, Alton, Hants. *Gladiolus primulinus*. Flowered in the Garden, 1908.
- BUENOS AIRES, MUNICIPAL BOTANICAL GARDEN. Collection of seeds. Plants raised for distribution to Fellows, 1909.
- BULLAR, Mrs., Carlton Crescent, Southampton. Vegetable marrow seeds from Florence. Will be tried in 1909.
- BUNYARD, G., Maidstone. Books for the Library.
- BUNYARD, MESSRS., Maidstone. Varieties of broad bean (p. 545), pea (p. 288), and scarlet runner (p. 545), and Brussels sprouts, cabbage, and parsley (trials in progress). Collections of raspberries and strawberries. For trial in 1909. Winter spray for fruit trees. See p. 552.
- BURN, W. J., Cromer. Collection of raspberries for trial in 1909.
- BURPEE, MESSRS., Philadelphia. Varieties of lettuce (p. 545) and tomato (p. 546), and Brussels sprouts and onion (trials in progress), and of *Celosia*, sweet pea and *Tropaeolum* (p. 549).
- CAMBRIDGE BOTANIC GARDENS (R. I. Lynch, Curator). Collection of seeds. Plants raised for distribution to Fellows, 1909.
- CAMPBELL, R., EXECUTORS OF, Manchester. Campbell's Nico-soap. See p. 551.
- CARLYON, Miss C. M., Bloemfontein, O.R.C. Seeds of *Moraea* sp. Plants raised but not yet flowered.
- CARPENTER, G., West Hall Gardens, Byfleet. Dahlias. See p. 291. Asters. Planted in the Garden. Seeds of a blue-flowered pea proved to be *Lathyrus sativus coeruleus*.

- CARTE, Lady D'OYLY, Weybridge. Seeds of *Magnolia Lennei*. Failed to germinate.
- CARTER, G., Cottenham, Cambs. Potato. See p. 525.
- CARTER, Messrs. J., High Holborn. Varieties of bean (p. 545), beet (p. 539), pea (p. 288), radish (p. 546), and onion and parsley (trials in progress).
- CHEAL, Messrs., Crawley. Dahlias. See p. 291.
- CHITTY, M. K., Govt. Bot. Gdns., Bangalore, Mysore. Bulbils of the variegated form of *Fourcroya gigantea*. Growing on in the Garden.
- CLARK, E. F., Teignmouth, Devon. *Sedum dendroideum*. Plants raised for the Garden and for distribution to Fellows, 1909.
- CLARK, Messrs., Dover. *Cimicifuga simplex*. Planted in the Garden.
- CLARK, E. F., Lowther Gardens, Penrith. Potato 'Up-to-Date.' See p. 538.
- CLEMENTI, M., Newton Abbot. Seeds of *Albizia*, *Bobartia*, *Cassia*, and *Physianthus*. Plants will be raised for distribution to Fellows.
- COLLISON, T., South Norwood. An unnamed seed, *Momordica* sp. Plant raised and flowered but found of no value.
- COLMAN, Sir J., V.M.H., Gatton Park. A collection of Orchids.
- COOMBER, T., The Hendre Gardens, Monmouth. Potato 'Up-to-Date.' See p. 538.
- CRACOW, UNIVERSITY BOTANIC GARDEN. A collection of seeds. Plants raised for distribution to Fellows, 1909.
- CRAWSHAY, DE BARRI, Sevenoaks. Tomato.
- CRUMP, W., Madresfield Court Gardens, Malvern. Potato 'Up-to date.' See p. 538.
- CUNNINGHAM, J., Omagh, co. Tyrone. Potatoes. See p. 525.
- CURGENVEN, Mrs., Lincaster Gate, W. A cutting of an Ivy near *Hedera pedata*. Plants raised.
- CURREY, Miss F. W., Lismore, Ireland. *Narcissus* 'Regina Margherita.' Planted in the Garden.
- DAMMANN, Messrs., Naples. Seeds of tomato (p. 546), *Dolichos Lab-lab soudanensis* (p. 545), miscellaneous flowering plants (p. 547), and cauliflower, leek and lettuce (for trial in 1909).
- DAVIES, J. H., Ross-on-Wye. Carnation and Delphinium (for trial in 1909).
- DAWES, T. E., King's Lynn. Rhubarb 'Challenge.' Added to the collection.
- DEAL, W., Kelvedon, Essex. Varieties of candytuft (p. 547), and broccoli and parsley (trials in progress).
- DE COURCY, F. A., Somerset East, Cape Colony. Seed which proved to be *Polygonum orientale*.
- DE LUZY FRERES, Camberwell, S.E. Sundries for knapsack sprayer.
- DELMAND, ALARICUS, Madeira. *Astrapaea*. Plants raised for distribution to Fellows, 1909. *Papaia*, *Rosa*, and *Xanthochymus*. Growing in the garden.
- DERBYSHIRE, F. H., Middlewich, Cheshire. *Chrysanthemum* 'Derbyshire's Crimson' (trial in progress).
- DOBIE, Messrs., Rothsay. Varieties of beet (p. 539), potato (p. 525), dahlia (p. 291), Godetia (p. 548), and Brussels sprouts, cabbage, parsley, early-flowering chrysanthemums and phloxes (trials in progress).
- DOUGLAS, J., V.M.H., Great Bookham. Alpine Auricula seed. Plants raised for the Garden. *Pinguicula caudata*. Growing on.
- EABLE, Mrs., Cobham. *Cineraria* var. Growing on.
- EDINBURGH, ROYAL BOTANIC GARDEN. A collection of seeds. Plants raised for distribution to Fellows, 1909.
- EDWARDS, W., Worth Hall Gardens, Crawley. Melon. See p. 546.
- ELWES, H. J., Colesborne. Seed of *Pinus Peuke*. Plants raised for the Pinetum.
- ENGLAND, E. T., Bury St. Edmunds. *Anemone sulphurea* seedlings. Planted in the Wild Garden.
- ENYS, J. D., Enys, Cornwall. Seed of *Myosotidium nobile* and *Cordyline indivisa*. Plants raised for the Garden and for distribution to Fellows, 1909.
- EVANS, J. SPENCER, Wootton Hill, Newbury. Carnation layers.
- FERGUSON, Col., Polebrooke Hall, Oundle. Pea (for trial in 1909).
- FERGUSON, G., Norton Priory Gardens, Runcorn. *Asparagus*, *Cyperus*, *Dieffenbachia*, *Eranthemum*, *Gloxinia*, and *Streptocarpus*. Seedlings for distribution to Fellows, 1909.
- FITT, J., Welwyn, Herts. Double Rocket. Planted in the Garden.
- FLEMING, Rev. W. W., Portlaw, co. Waterford. Cuttings of rare shrubs. Plants raised for the Garden.
- FORBES, JOHN, Hawick. Phloxes. Trial in progress.
- FOWLER, GUNNEY, Glebelands, South Woodford. Orchid seedlings. Growing on.
- FOX, W. L., Falmouth. *Cordyline australis*. Seedlings for distribution to Fellows, 1909.
- GIBBS, Hon. VICARY, Elstree. Seedlings of new and rare shrubs for the Garden.
- GILL, B., Falmouth. *Arundinaria nobilis*, *Embothrium coccineum*, *Rhododendron Falconeri*. Planted in the Garden.

- GRAY, ZECH., Sandy, Beds. Brussels Sprouts. Trial in progress.
- GREAVES, Miss A., Roselea, Reigate. *Geranium lucidum*. Planted in the Wild Garden.
- GREEN, H., Godlands, Maidstone. Seed of *Solanum* sp. Not identified.
- GREENWOOD, H. J., Bracknell, Berks. *Clitoria Ternateu* seeds. Plants raised and distributed to Fellows, 1908.
- GUILFOYLE, W. R. See Melbourne.
- GUNN, Messrs., Olton. *Viola cornuta purpurea*. Planted in the Wild Garden.
- HANBURY, Lady, La Mortola, Italy. A collection of seeds. Plants raised for distribution to Fellows, 1909.
- HARRINGER, T. C., Enfield Highway, Middlesex. Luckan's patent frame light. See p. 551.
- HARRIS, H., Horsham. Parsley. Trial in progress.
- HARRIS, J., Blackpill, Swansea. Potato 'Up-to-Date.' See p. 538.
- HARRISON, Messrs., Leicester. Miscellaneous vegetable seeds. See p. 545.
- HARVEY, Miss L., Probus, Cornwall. Seeds of unnamed leguminous shrub.
- HARVEY, Sir ROBERT, Bart., Langley Park, Slough. *Crimum* sp. Growing on.
- HAYMAN, H. L., West Hampstead, N.W. Calabash seeds. See p. 545.
- HEILBUT, S., Holyport, Maidenhead. Mulla-ga-tawn peach and 'flowering' banana. Growing on.
- HEINEMAN, F. C., Erfurt. Brussels sprouts and cabbage. Trials in progress.
- HEMUS, Miss H., Upton-on-Severn. Sweet peas. See p. 549.
- HENDERSON, Surg.-Major G., M.D., Otford, Kent. Smyrna fig with fly.
- HIBBERD, C. MAXWELL, Natal. *Richardia Reimanni*. Growing on.
- HILL, DANIEL, Watford. Seedling 'Edelweiss' for distribution to Fellows, 1909.
- HINDMAISH, W. T., Alnwick. Tomato. See p. 546.
- HOBDAY, G., Romford, Essex. Pea. See p. 290.
- HOFFMANN, R., Streatham. Seedling Caladiums for the Garden and for distribution to Fellows, 1909.
- HOLFORD, Col., C.I.E., C.V.O., Tetbury. *Pinus* sp. Planted in the Pinetum.
- HOLMES, E. C., Brookfield, Arundel. Runner bean, black-seeded (for trial in 1909)
- HOLMES, E. M., Bloomsbury. *Sapum verum*. Not yet germinated.
- HOOPER, H., Battle, Sussex. Bulb from Calcutta and seeds from New Zealand.
- HOKINS, Miss, Shepperton. *Gaultheria procumbens macrocarpa* and *Polygonum spectabile variegatum*. Planted in the Wild Garden.
- HONE, Venble. Archdeacon, Carowe, N. S. Wales. Seeds of *Clanthus Dampieri* and *Phystostegia virginiana*. Plants raised for the Garden.
- HOUGHTON, H. E., Teynampet, Madras Presidency. Seeds collected in the jungle. Not yet germinated.
- HOWARD, Mrs., Woking. 'Chinkerring Cheese' (*Ornithogalum* sp.) from South Africa.
- HULL OIL MANUFACTURING Co., Hull. 'Homco' soluble paraffin.
- HUMPHREYS, T., Edgbaston. Cuttings of *Bougainvillea glabra*. Plants raised for distribution to Fellows, 1909.
- JOHNSON, Messrs., Boston, Lincs. Varieties of beet (p. 539) and Brussels sprouts, cabbage and parsley (trials in progress).
- JOHNSTONE, Mrs., Pulborough, Sussex. Plants raised from seed from tropical Africa. *Datura* sp. near *D. arborea*, *Cassia* sp., and another plant not yet identified.
- KENT, G., Dorking. Dahlias. See p. 291. Aster 'Frank Kent.' Planted in the collection.
- KENT & BRIDON, Messrs., Darlington. Brussels sprouts and parsley. Trials in progress.
- KENWARD, Messrs., Lewes. Potato. See p. 525.
- KEW, DIRECTOR, ROYAL GARDENS. Collection of seeds. Plants raised for the Garden and for distribution to Fellows.
- KINGSMILL, A., Harrow Weald. Collection of choice Narcissi. Planted in the Garden.
- KIRK, A., Alloa. Potato 'Up-to-Date.' See p. 538.
- KISSLING, N., Vegesack, Bremen. Porcelain labels. See p. 551.
- KITSON, C. W., Netherbury. *Clumonanthus fragrans* seed. For the Garden and for distribution to Fellows.
- LAWRENCE, Sir Trevor, Bart., Burford, Dorking. Collection of seeds. Seeds and plants distributed to Fellows.
- LAXTON BROS., Bedford. Varieties of apple, black and red currant, gooseberry, plum, raspberry and strawberry. For trial.
- LETTES, S., Jong Buckley, Rugby. Potato. See p. 525.
- LEWIS, Mrs. SOMERS, Byfleet. Seeds of 'Blue Kennedy's.' A few plants raised.
- LINDSAY, R., Murrayfield, Midlothian. *Xanthorrhiza apifolia* and *Vellozia elegans*. For the Garden.
- LOAT, W. L. S., Cumnor Place, Oxford. Seeds from Western Australia. Not yet germinated.

- LODER, SIR EDMUND, Bart., Leonardslee. A collection of seeds. Seeds and plants for distribution to Fellows.
- LYNCH, R. I. See CAMBRIDGE.
- MC CALLUM, J., Winchmore Hill, Midx. Potato. See p. 525.
- MCDUGALL, Messrs., Manchester. Fruit tree washes, banding grease and grease-proof paper. See p. 551.
- MCGREDY, Messrs., Portadown. Varieties of cabbage. Trial in progress.
- MC LAREN, H. D., Bodnant, N. Wales. *Eucryphia pinnatifolia*, *Gladrolus princeps*, *Pinus Bungeana*. For the Garden.
- MAGOR, E. J. P., St. Tudy, R.S.O., Cornwall. Seeds of *Primula Cockburniana* and *P. pulverulenta* and plants of *Aristolochia* sp., *Leptospermum bullatum* and *Primula imperialis*. Spare plants will be distributed to Fellows.
- MARSHALL, W., V.M.H., Boxley. Cuttings of *Helianthemum*, *Ligustrum*, and *Thymus*. Plants raised for the Garden.
- MAHON, Miss, Westminister. Alpine Primulas. For the Rockery.
- MASSEY, Messrs., Spalding. Potatoes (p. 525). Parsley. Trial in progress.
- MAWSON BROS., Windermere. *Papaver orientale* 'Jennie Mawson.' For the herbaceous border.
- MEASE, W., Leatherhead. Potato 'Up-to-Date.' See p. 538.
- MELBOURNE BOTANIC and DOMAIN GARDENS (director W. R. Guilloyle). A collection of seeds. Plants raised for distribution to Fellows.
- MELLOB, A. V., Qumbu, East Griqualand, S.A. Seeds of a leguminous herb. Not yet flowered.
- MOORE, Messrs., Rawdon, Leeds. A collection of orchids, and bulbs of *Lilium sulphureum* for the Garden.
- MORTIMER, S., Rowledge, Farnham. Dahlias. See p. 291.
- MOSS, J. S., Bishop's Waltham. Odontoglossums. For the Garden collection.
- MOWATT, Mrs., Haslemere. *Smilax aspera variegata*, *Tropaeolum tuberosum*, *Vincetoxicum officinale*. For the Garden.
- NICHOLS, J., Bideford. 'Success' propagating tray. See p. 551.
- NUTTING, Messrs., Southwark. Varieties of beet (p. 539), cabbage and parsley (trials in progress).
- ONELL, J. W., Stanmore. Books for the Library.
- ONslow, Lord, Clendon Park. *Veronica repens*. For the Rockery.
- PAIR, H., New Barnet. Kale. Trial in progress.
- PEAKE, Mrs., Newbury, Berks. Morning Glories. See p. 549.
- PEARSON, Messrs., Lowdham, Notts. Hand-hoe. See p. 551. Strawberries. For forcing trial, 1909.
- PECK, Mrs. KENNICK, Bathampton, Bath. *Viola hederacea*. For the Garden.
- PERCY, G. V., Puerto Orotava, Teneriffe. Seeds of *Statice* spp. Plants will be raised for distribution.
- PERRY, Amos, Enfield. A collection of herbaceous phloxes for trial and of plants for the herbaceous border.
- PETERS, W., Leatherhead. *Lamium maculatum album*. For the Wild Garden.
- PFITZER, W., Stuttgart. Raspberry for trial in 1909.
- PHILLIPS, H. T., Olney, Bucks. Potato. See p. 525.
- PHILLIPOTS, EDEN, Torquay. A collection of plants for the Garden.
- PICKETT, J., Eynsham, Oxford. Potato. See p. 525.
- PILGRIM, W., Anglesey. Potato. See p. 525.
- PILLINGERS, Chepstow. 'Pix Compo.' See p. 551.
- PINCHES, JOHN, Camberwell, S.E. 'Charterus' plant protector. See p. 551.
- PIRIE, Miss, Ripley. Miscellaneous plants for the Rockery.
- PIRIE, D. V., Caskieben, Aberdeenshire. *Clematis calycina*, *Daphne Dauphina*, *Lonicera fragrantissima*. For the Garden.
- POPE, W., Thatcham, Berks. Onion.
- POTTER, J. WILSON, Croydon. *Hymenophyllum pectinatum*, *Ouwirandra fenestralis*, *Todea superba*, *Trichomanes radicans*. For the Garden.
- PRIEST, W., Kilwinning. Potato 'Up-to-Date.' See p. 538.
- READ, R. J. G., Westminster, S.W. 'Cultivon.' See p. 551.
- RICHARDS, G. H., Borough High Street, S.E. Orchid peat.
- RICHARDS, R., Holmes Chapel. Peas. See p. 288.
- RICHARDSON, Miss H., Crown Hill, R.S.O., Devon. 'Peach-vine.' See p. 546.
- RICHARDSON, Messrs., Darlington. Lever handle for ventilator gearing.
- RICHMOND, Mrs., Lustleigh, Devon. Seeds from India. Plants raised for distribution.
- RICHMOND-POWELL, W. W., Canterbury. Seed of *Melittis melissophyllum*. For the Garden.
- RIVERS & SON, T., Sawbridgeworth. Raspberries. For trial in 1909.
- ROBERTSON, J. J., Virginia Water. Scions of an unnamed apple. Grafted 1908.
- ROBSON, H. F., Ham. Chrysanthemums. Trial in progress.

- ROEMER, FRIEDRICH, Quedlinburg, Germany. Seeds of miscellaneous flowering plants. See p. 547.
- ROSS OF BLADENSBURG, SIR JOHN, K.C.B., Rostrevor, Ireland. Seed of *Lilium giganteum* and *Olearia insignis*. Germinating.
- ROTTSCHILD, LEOPOLD DE, Gunnersbury, W. Alpine and forcing Strawberries. For trial 1909. *Primula capitata* and *Salviasplendens* 'Zurich.' For the Garden and distribution to Fellows.
- SANDEMAN, COL. J. G., M.V.O., Hayling Is., Havant. Collections of seeds. Plants raised for the Garden and for distribution to Fellows.
- SANDER, MESSRS., St. Albans. Collection of orchids. For the Garden.
- SANDS, W. E., Hillsborough, co. Down. 'Up-to-Date' and other Potatos. See pp. 525, 538.
- SCARLETT, T. A., Edinburgh. Viola 'Edina.' For trial in 1909.
- SCHROEDER, BARON, SIR HENRY, Bart. Leaves of Rex Begonias. Plants raised for the Garden and for distribution to Fellows.
- SCHRAPE-DICKINS, C., Achill, co. Mayo. Early-flowering Gladioli and *Lilium tigrinum splendens*. For the Garden.
- SEALE, M. V., Sevenoaks. Dahlias. See p. 291.
- SEARLE, C. E., Chelmsford. Beet. See p. 539.
- SHARMAN, Mrs., Limpsfield, Surrey. A collection of seeds from Colorado. Growing on in the Garden.
- SHARPE, MESSRS. CHAS., Sleaford. Varieties of beet (p. 539), potato (p. 525), Brussels sprouts, and cabbage (trials in progress).
- SLADE, T. H., Poltmore Gardens, Exeter. Potato 'Up-to-Date.' See p. 538.
- SLOCOCK, W. C., Woking. Apple stocks. Budded 1908 for experimental purposes.
- SMITH, MESSRS. F., Belfast. Tomato. For trial in 1909.
- SMITH, MESSRS. R., Worcester. *Pinus Montezumae*. Planted in the Garden.
- SMITH, MESSRS. W., Aberdeen. Potato. See p. 525.
- SMITTELLINHO, BARON DE, Oporto. Seed of St. Peter's Poppy. For trial in 1909.
- SPENCER-EVANS, J., Newbury. Tea-seed which failed to germinate.
- STAWARD, R., Panshanger Gardens, Herts. Varieties of Brussels sprouts, cabbage and parsley. Trials in progress.
- STRETT, C., Floors Castle Gardens, Kelso. Potato 'Up-to-Date.' See p. 538.
- SUTCLIFF, Dr., Ripley. Carnation var. Growing on.
- SUTTON, ARTHUR, W., Reading. Peas for inoculation experiments. See p. 231.
- SUTTON, MESSRS., Reading. Varieties of beet (p. 539), Brussels sprouts, cabbage, parsley, (trials in progress).
- SYDENHAM, R., Birmingham. Varieties of beet (p. 539), pea (p. 288), potato (p. 525), Brussels sprouts, cabbage, parsley (trials in progress), and miscellaneous flowers (p. 547).
- TAYLOR, Mrs., Henley-on-Thames. Seeds of oil olives from Tivoli not yet germinated. Seeds and plants of *Palurus australis*. Growing on.
- TAYLOR, G., Ferrybridge, Yorks. Potato. See p. 525.
- THOMAS, G., Coedmore, Cardigan. Chrysanthemums.
- THOMAS, Dr. R. S., Exmouth. *Paulownia imperialis*. Growing on.
- THURLOW, Major E. H., Ashley Gardens, Westminster. *Arundinaria anceps*. Planted in the Wild Garden.
- TOD, H. M., Seething Lane. Vine cuttings. Plants raised for the Vineyard.
- TRAHERNE, Capt. G. G., Strathaven, N.B. *Francoa ramosa*, *Physalis Franchetti*, *Primula kewensis*. For the Garden and for distribution to Fellows.
- TRESEDER, W., Cardiff. Dahlias. See p. 291. Cabbage. Trial in progress.
- TURNHULL, T. S., St. Anne's-on-Sea. Varieties of Croton and Dracaena. Plants raised for distribution to Fellows, 1909.
- TURNER, E. E., Coggeshall, Essex. *Primula acaulis* var. *chlorantha*.
- TURVEY, R., Cranleigh, Surrey. *Lupinus polyphyllus* var. *roseus*. For the herbaceous border.
- TYLER, F. W., Clitheroe. Potato 'Up-to-Date.' See p. 538.
- VALKERING, G. J., Netherlands Consulate, Hull. Insecticide and fungicide.
- VASMER, T., Bushey Heath, Herts. *Marica Northiana* var. *splendens*. For the Garden and for distribution to Fellows.
- VEITCH, H. J., Chelsea. *Primula angustidens*, *P. Cockburniana*, *P. pulverulenta*, and seed of *P. Parryi*.
- VEITCH, MESSRS. J., Chelsea. Apple and pear stocks for experimental purposes. Collection of Conifers for the Pinetum. Varieties of beet (p. 539), potato (p. 525), asparagus, Brussels sprouts, cabbage, parsley (trials in progress), and miscellaneous flowers (p. 547). Manure.
- VEITCH, R., Exeter. *Nerine Bowdieri*. For the Garden. Varieties of beet (p. 539), leek, potato (p. 525), tomato (p. 546), asparagus, cabbage (trials in progress), and miscellaneous flowers (p. 547).

- VILMORIN-ANDRIEUX, Messrs., Paris. Varieties of beet (p. 539), Brussels sprouts, cabbage, parsley, savoy (trials in progress).
- VOSS, Messrs., Millwall. Fruit-tree banding grease, grease-proof papers, winter and Woburn washes, phospho-nicotyl, wonderful fertiliser, sweet pea manure, vaporisers, &c. See p. 551.
- WADDS, A. B., Worth, Sussex. Tomato. See p. 546. Eyes of white grape.
- WAKEFIELD, Mrs., Uxbridge. Seeds of *Brachychiton* and *Hakea*. Plants raised for the Garden and for distribution to Fellows.
- WAKELEY, Messrs., Honduras wharf, S.E. Hop manure.
- WAKELY, C., Chelmsford. Asters and *Libertia*. For the Garden.
- WALKER, J., Turner's Hill, Surrey. Achimenes and Tydaeas. For the Garden and for distribution to Fellows.
- WALLACE, G., Busby, nr. Glasgow. Brussels sprouts. Trial in progress.
- WALLACE, Messrs., Colchester. Montbretia 'Prometheus.' For the Garden (see p. 548).
- WARE, Messrs., Feltham. Dahlias. See p. 291.
- WELLS, H. M., Twyford, Berks. Lupin seeds.
- WELLS, Messrs., Merstham. Chrysanthemums. Trial in progress.
- WEST, J. T., Brentwood. Dahlia. See p. 291.
- WESTON, J. G., Ashford, Kent. Potato 'Up-to-Date.' See p. 538.
- WETTSTEIN, Dr. R., Director Botanic Garden, Vienna. Collection of seeds. Plants raised for distribution to Fellows.
- WHITELEY, H., St. Marychurch, Torquay. Seeds of Manitoba Maple. Not yet germinated.
- WHYTE, R. B., Ottawa, Canada. Raspberry 'Herbert.' For trial in 1909.
- WIGLEY, H., Whitehill, Gravesend. Kale. Trial in progress.
- WILKS, E. S., Cobham, Surrey. Potato. See p. 538.
- WILKS, Rev. W., Shirley. Vine cuttings and seeds of a large-flowered *Verbascum* and *Viola Pesneau*. Plants raised for the Garden and for distribution to Fellows.
- WILLIAMS, P. D., St. Keverne, Cornwall. Collection of Narcissi, Rhododendron grafts, *Primula imperialis*. For the Garden. Seed of *Olearia insignis*. For the garden.
- WILLIAMSON, J. F., Mallow, Cork. Potatoes. See p. 525.
- WILLIAMSON, Mrs., Weybridge. Collections of seeds from New Zealand, &c. Plants raised for the Garden and for distribution to Fellows.
- WILLMOTT, Miss, Warley. Collection of seeds. Plants raised for the Garden and for distribution to Fellows.
- WOODHOUSE, Dr. CECIL, Esher. *Ornithogalum lacteum* and *Viola* sp. from Canada. For the Garden.
- WORSLEY, A., Isleworth. *Cereus* and *Phyllocactus*. For distribution to Fellows.
- WORSTER, E., Wood Green, N. Potato. See p. 525.
- YORKE, Sir HENRY R., Iver Heath, Bucks. Seeds of pines from Mexico. Plants raised for the Pinetum.
- YULE, J., JUN., Cothal, Aberdeen. Pea. See p. 288. Potato. See p. 525.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE & HORTICULTURAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

There are still, we feel, some departments of Horticulture and Horticultural Science very imperfectly represented in these abstracts, and the Editor would be grateful if any who have time at command, and who are willing to help in any special direction in this work, would communicate with him. He desires to express his most grateful thanks to all who co-operate in the work, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on is as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal, &c., in which the original article appears, taking care to use the abbreviation which will be found on pp. 264, 265.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as "fig.," "tab.," or "plate."

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.L.S., F.R.H.S.
 Cook, E. T., F.R.H.S.
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 Cotton, A. D., F.L.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
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 Farmer, Professor J. B., M.A., D.Sc., F.R.H.S.
 Goldring, W., F.R.H.S.
 Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
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 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Houston, D., F.L.S., F.R.H.S.
 Kent, A. H., A.L.S., F.R.H.S.
 Long, C. H., F.R.H.S.
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 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Wilson, Gurney, F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used for their titles.

Journals, &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort. . . .	Ann. Soc. Nant. des Ami Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica . .	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticoltura . .	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations . .	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand . .	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies .	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Economic Biology	Jour. Econ. Biol.
Journal of Economic Entomology	Jour. Econ. Entom.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Le Jardin	Le Jard.
Lebensgeschichte der Blütenpflanzen Mitteleuropas	Lebens. d. Blütenpfl.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin .	Not. Königl. Bot. Berlin.
Orchid Review	Orch. Rev.
Orchis	Orchis.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.

Journals, &c.	Abbreviated title.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Woburn Experiment Farm Report	Woburn.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Acalyphas, New Hybrid. By H. A. Sandhack (*Die Gartenw.* lviii. p. 685; Nov. 7, 1908).—At the time when *Acalypha Sanderiana* (or better *A. hispida*) and *A. Godseffiana* were introduced it was pointed out that they were good subjects for hybridization, and a few years would see a number of very distinct forms; however, such were not obtained until nine years later. The raiser tells us the crossing was easier than the germination of the seeds, and he only succeeded in raising seedlings during the summer of 1907; and even in the very young state the seedlings showed signs of being different from the parents. When a year later the plants flowered, only the best were kept. The following are the most distinct:—

A. Camphauseniana, very vigorous, but graceful; leaves 30 cm. long and 20 cm. broad, dark green with light-coloured veins and cream-tinted margin. The greatest beauty is, however, in the magnificent catkin-like inflorescences, at first greenish-white, later rose, changing to orange.

A. Beissneriana is of quite different habit from the former, very vigorous and compact in growth, with broad, short foliage. The flowers are whitish at first, later rose to carmine. It is hoped, as it is rather hardy, to use *A. Beissneriana* for summer bedding.

A. Johniana is rather small in comparison with the foregoing, of freely branching habit; colour of flowers (no staminate flowers have been produced) like that in *A. Camphauseniana*.

A. Hesdoerfferiana.—This is one of the most distinct, partaking in the characters of all three of the foregoing. The dense flowers are bright green at first, changing to yellow.

A. Wagneriana.—In habit very much like *A. Johniana*, but with white-edged foliage, and the inflorescences about 50 cm. long and less branching than the former.

A. Sandhackiana.—Resembles *A. Beissneriana*; of compact, vigorous habit, with smaller, longer leaves, edged with cream. The numerous inflorescences are 15 to 20 cm., of a pretty rose colour. Extraordinarily floriferous.—*G. R.*

Aechmea nudicaulis. By J. H. Hart (*Bull. Bot. Dep. Trin.* No. 54, p. 197; April 1907).—Quantitative analyses of this Bromeliaceous epiphyte, and of the liquid contained in the cup formed by the leaves, showing it contains nearly 21 per cent. of organic matter, and the liquid constantly overflowing during rains, must add much of manurial value to the soil: 8.62 tons of the plant were removed from one large Samoan tree.—*E. A. B.*

Agave macroacantha and Allied Eu-agaves. By W. Trelease (*Rep. Miss. Bot. Gard.* 1907, pp. 281–256; 17 plates).—A detailed

description, historical account, and synonymy of three species, *A. macroacantha*, *A. Karwinskii*, and *A. rubescens*, with several illustrations of each of them. Under the first name *A. flavescens*, *A. Besseriana*, *A. pugioniformis*, and other names are sunk; under the second are sunk *A. Corderoyi* and *A. Bakeri*; and under the third *A. flaccida* and *A. punctata*.—*G. S. B.*

Agave Watsoni. By J. R. Drummond (*Bot. Mag.* tab. 8214).—Nat. ord. *Amaryllidaceae*; tribe *Agaveae*. Central America (?). Stem very short; leaves apple-green, fifteen to twenty in a rosette; flowering stem 9 feet; bracts awl-shaped; perianth lobes green with a white margin.—*G. H.*

Alkali Soils, Comparative Tolerance of various Plants for Salts common in. By T. H. Kearney and L. L. Harter (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 113; October 1907).—It is shown that different varieties of the same species of plant differ considerably in their powers of resistance to the action of magnesium and sodium salts in pure solutions; and closely related species of the same genus show similarly marked differences. Great differences exist between different plant species, even when belonging to the same family, in tolerance of pure salt solutions. The addition of calcium sulphate in excess was found to greatly diminish the toxicity of the magnesium and sodium salts to all the plants (eight species) tested. The effect of mixed solutions of "alkali" salts was also studied.—*F. J. C.*

Anemone variata. By F. Foucard (*Bull. Soc. Hort. Loiret*, viii. No. 9, 1908, p. 343).—Describes this new garden form as a probable cross between *A. fulgens* and *A. stellata*, and useful for the spring garden and for cutting.—*E. A. B.*

Anisotes diversifolius. By T. A. Sprague (*Bot. Mag.* tab. 8219).—Nat. ord. *Acanthaceae*; tribe *Justicieae*. Socotra. Shrub 1½ foot high; leaves elliptic ovate, ¾–1¾ inch long; cymes short; flowers pendulous; corolla flame-coloured, 1½–2 inches long.—*G. H.*

Anthurium Scherzerianum rotundispathum. By R. Jarry-Desloges (*Rev. Hort.* November 1, 1908, pp. 496–7; coloured plate).—The plate represents a very fine form indeed, with an almost circular spathe of large size, white profusely sprinkled or spattered with small crimson spots on upper surface, while the inferior surface is almost suffused with scarlet mottling on a white ground; very handsome spadix, yellow, and spirally twisted.—*C. T. D.*

Aphides, Notes on. By C. P. Gillette (*Journ. Econ. Entom.* i. 3, pp. 176–181; June 1908).—Descriptions of *Aphis gossypii* Glover, *A. medicaginis* Koch, *A. carbocolor* Gill, *A. oenotheriae* Oest., *A. forbesi* Weed, together with a discussion of the influence of the host plant upon the characteristics of the aphides, with the observation that "in all our experience . . . we have never had any reason to think that a species is perceptibly changed in appearance because of a change

of food plant." *A. gossypii* and *A. medicaginis* are found on a number of different unrelated host plants, while in Colorado *A. oenotheriae* appears to be restricted to primroses, and *A. carbocolor* to species of *Rumex*.—*F. J. C.*

Apple and Quince Trees, Some Stem Tumours or Knots on.

By G. G. Hedgecock (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ. 8*; May 1908; 11 figs.).—Tumours, at first having the form of a smooth swelling surrounding the base of a dormant bud—frequently a terminal bud—but sometimes appearing without connection with buds, are described. They vary from swellings as small as a pea to 2 to 3 inches in diameter. Later the bark of these swellings ceases to grow, but internal growth continues, and as the bark splits and breaks away small elevations resembling short thickened root-caps appear on the surface of the tumours, giving them a warty appearance. Roots are very freely produced from these tumours when they are buried, and it is considered that they are the same disease as "the woolly-knot form of hairy-root"—the aërial form of that disease. So far as can be definitely said at present, the disease causes very little harm to the tree. It is common in Britain on certain varieties of apple. Nurserymen are advised in the Circular to exercise care in the selection of their stocks.—*F. J. C.*

Apple Blossom Weevil. By Walt. E. Collinge, M.Sc. (*Jour. Bd. Agr. xv. 1908, p. 674*).—A life-history of this serious pest (*Anthonomus pomorum*, Linn.) is given, and notes concerning the use of grease bands in catching it. The latter method has proved futile. It is recommended that the trees which are attacked should be jarred, so as to shake off the brown blossoms containing the larvæ and pupæ on to a sheet, and to burn these, together with the beetles that are obtained, while in large orchards clean cultivation is a great help towards keeping the pest in check.—*F. J. C.*

Apple Foliage, Caterpillars injuring, in late Summer. By E. D. Sanderson (*U.S.A. Exp. Stn. New Hampshire, Bull. 139*; July 1908; figs.).—A number of caterpillars are reported doing more or less injury to apple foliage during the autumn; they may be controlled by spraying with an arsenical spray such as Paris green or, preferably, arsenate of lead about the beginning of August, the time when also the brown-tail moth should be sprayed for. The insects described and excellently figured are the fall web-worm (*Hyphantria textor* Harris); the yellow-necked apple caterpillar (*Datana ministra* Drury); the red-humped apple caterpillar (*Schizura concinna* S. and A.); the hickory tiger moth (*Halisdota caryae* Harris); the rusty tussock moth (*Notolophus antiqua* Linn.); and the white-marked tussock moth (*Hemerocampa leucostigma* S. and A.).—*F. J. C.*

Apple Maggot. By A. L. Quaintance (*U.S.A. Dep. Agr., Bur. Entom., Circ. 101*; May 1908; 2 figs.).—This two-winged fly (*Rhagoletis* [*Trypeta*] *pomonella* Walsh) punctures the skin of the apple in July, causing a brownish speck to appear. The larva tunnels into the flesh of the fruits, and the flesh which is not eaten turns brown, and so renders

the trail of the maggot more easily seen. The larvæ mature when the fruit ripens, leaving it and pupating either on the ground under the decayed fruit or burrowing into the earth to the depth of about an inch. When the fruit has been packed in barrels the pupæ are often found at the bottom of the receptacle, and are therefore liable to be distributed over the world wherever the fruit is taken. The fruit when picked often shows no sign of injury. The pest is difficult to deal with, and arsenical washes have proved of no avail. All fallen fruit should be collected and destroyed, and frequent tillage should be resorted to. The insect, fortunately, spreads but slowly from tree to tree. It is generally distributed through the New England States and attacks *Crataegus* as well as apple.—*F. J. C.*

Apple Worm, The Lesser. By A. L. Quaintance (*U.S.A. Dep. Agr., Bur. Entom., Bull. 68, Part V.; October 1907; figs.*).—The larva of this insect, *Enarmonia prunivora*, injures apples by boring holes into them in much the same way as the codlin moth. A full description is given, and in many ways the life-history is very similar to that of the codlin moth. Thorough spraying with arsenical sprays is recommended. The moth is not yet known in Britain.—*F. J. C.*

Apple, Trumpet-leaf Miner. By A. L. Quaintance (*U.S.A. Dep. Agr., Bur. of Entom., Bull. 68, Part III.; 2 figs.*).—This insect (*Tischeria malifoliella*), one of the Tineidae, is occasionally abundant in parts of the States. The larvæ mine exclusively on the upper surface of the leaves of the food-plants, which include, in addition to the apple and other species of *Pyrus*, species of *Rubus* and *Crataegus*, though possibly the form on *Rubus* is distinct. The tunnels are of a trumpet or mussel-shell form, about $\frac{1}{2}$ inch in length and $\frac{1}{4}$ inch in breadth. The seasonal history is given: the larvæ hibernate in the fallen leaves, and pupate in the spring, the moths emerging about the end of April; other broods are produced during the year. The larva is attacked by numerous parasites. Spraying the leaves with a 10 per cent. to 15 per cent. kerosene emulsion is recommended if the attack should assume serious proportions. This was found to kill the larvæ, and when done on clear, bright days not to injure the leaf.—*F. J. C.*

Azaleas, New. By A. G. Van Eeckhante and G. T. Grignan (*Rev. Hort. September 16, 1908, pp. 424-5; coloured plate*).—The plate represents two very charming varieties, *Azalea Vervaeaneana*, a large double flowered pure white form, and *A. Todogava* also double, magenta slightly splashed in centre of petals with crimson; the latter very hardy.—*C. T. D.*

Bacopa amplexicaulis. By E. Wocke (*Die Gartenw. lx. p. 709; Nov. 21, 1908*).—A rather rare aquatic introduced from Florida, adapted for in and outdoor cultivation, either as an aquatic or as a bog plant. A very interesting and pretty species, with small amplexicaul, ovate leaves and small white flowers.—*G. R.*

Begonias, Double multiflora strain. By P. L. de Vilmorin (*Rev. Hort. July 16, 1908, p. 828; coloured plate*).—The plate represents three very fine forms, viz. 'Souvenir de Louis Urbain,' rich scarlet; 'Shah de

Perse,' very double, Camellia form, deep rose; and 'La Fiancée,' double white.—*C. T. D.*

Berberis yunnanensis. By J. Hutchinson (*Bot. Mag.* tab. 8224).—Nat. ord. *Berberidaceae*; tribe *Berberaceae*. China. Shrub, 8–6 feet high; leaves obovate, $\frac{3}{4}$ –1 $\frac{1}{2}$ inch long; flowers solitary or in few-flowered fascicles, pale yellow; berry red.—*G. H.*

Birds of California in relation to the Fruit Industry. Part I. By P. E. L. Beal (*U.S.A. Dep. Agr., Biolog. Survey, Bull.* 80).—The author gives the results of the examination of the stomach-contents of a number of Californian birds, and by that means determines their economic importance. To arrive at a definite conclusion with regard to any species, he considers some 500 stomachs, well distributed through the year, as necessary. The birds dealt with are, with the exception of the tree creeper and sand martin, of species not occurring in this country; yet several of our genera and families are represented. Several species of tits are examined, and are found to eat a good deal of fruit, so that if numerous they would be a nuisance; they also eat many insects, particularly plant-bugs and caterpillars, with some scale-insects—the worst fruit pests in that country.

Two kinglets, allied to our goldcrest, are found to be wholly useful, particularly in eating weevils and scale-insects.

Six species of swallows or martins eat largely small wasps, plant-bugs, gnats, and beetles, all harmful except a few parasitical ichneumon-flies and a few ladybirds; presumably the swallows in this country take much the same food. To say that a bird feeds on insects is not sufficient proof that it is useful, as is well seen in the case of the vireos, small birds peculiar to America: these eat quite a number of ladybirds, which are of great value in keeping down aphides. The Californian shrike eats a certain number of the useful carabid beetles, but it makes up for this by the large number of grasshoppers and locusts it destroys; it also takes a few small birds, generally useful, and some mice and voles.

Their worst fruit-eater is a bird they call the linnet or house-finch, related to the rose-finch which has occurred once or twice in England; yet fruit only forms 10 per cent. of its food, while weed-seed amounts to 86 per cent., so that it is only because it is very common that it is really harmful. The russet-back thrush takes cherries and some bush-fruit, but also eats a quantity of injurious insects; the young are fed almost entirely on insects.

Two other birds, the robin (a kind of thrush) and the western tanager, occasionally arrive in vast hordes on migration and commit great havoc; the robin comes in late autumn, and in one or two years has eaten the olives wholesale; nothing could be done but to pick the fruit as rapidly as possible; the tanager comes in June and attacks the cherries. Fortunately this phenomenon of large flocks on migration does not occur to any extent in England except with a few insectivorous birds on the east coast.—*C. H. H.*

Birds, The Food of British. By R. Newstead, F.R.H.S. (*Jour. Bd. Agr. Supplement*, xv.; Dec. 1908).—A valuable and important contri-

bution to our knowledge of the food of a large number of British birds based upon the examination of the contents of nearly a thousand stomachs of birds. Lists are given of the birds which are considered wholly innoxious, including the mistle thrush, fieldfare, hedge sparrow, redstart, flycatchers, shrikes, cuckoo, swallow, martin, swift, long-tailed, coal, and marsh tits, &c.; species which are for the most part useful, though occasionally injurious, including robin, linnet, yellowhammer, corn bunting, skylark, woodpeckers, barn, tawny, and short-eared owls, kestrel, heron, and black-headed gull; species acting as scavengers; species generally considered pests of the garden, but with the balance of utility in their favour, including song thrush, great and blue tit, greenfinch, chaffinch, rook; species generally beneficial from an agricultural point of view, but destructive to game and other birds or their eggs and young; species which are destructive and doubtfully of any utility, including blackbird, bullfinch, sparrow-hawk, raven; and species wholly destructive and useless, carrion crow, house sparrow, wood pigeon.—*F. J. C.*

Bitter-rot of Apples: Horticultural Investigations. By J. C. Blair (*U.S.A. Exp. Stn. Illinois, Bull.* 117; August 1907; 2 figs.).—Experiments in controlling bitter-rot (caused by *Glomerella rufo-maculans*), continuing over five years, are reported. Considerable difference in behaviour under spraying is reported; but it is concluded that properly made Bordeaux mixture, applied in a proper manner, will save 90 per cent. of the fruit liable to attack by bitter-rot. The best results were obtained when the fruit was sprayed in such a manner as to be thoroughly coated with the spray-mixture when the first infection of the disease appeared. Dust spraying proved ineffectual; pure copper sulphate failed to check the disease. Three applications should be made: one in the last week in June, the others at intervals of ten days. The main factors encouraging the disease are: (1) A period of hot weather accompanied by frequent rains, and heavy dews at the time the apples are approaching maturity; and (2) the presence of canker spots upon the limbs of the tree and mummied fruits left hanging (see *JOURNAL R.H.S.* xxxiii. p. 587).—*F. J. C.*

Blossoming of Fruit Trees, Notes on Time of. By C. H. Hooper, M.R.A.C. (*Jour. Bd. Agr.* xv. 1908, p. 678).—The period over which gooseberries, currants, cherries, strawberries, plums, apples, and pears were in bloom during 1908 is given, and the order of flowering. The observations were undertaken with the object of ascertaining what damage was attributable to frost; but as the period of flowering was remarkably free from frost during 1908 no conclusions could be arrived at. The importance of planting varieties which flower together so as to secure cross-fertilization is pointed out (see also *JOUR. R.H.S.* xxvii. p. cxc. and xxviii. p. clxvi).—*F. J. C.*

Bulbophyllum galbinum. By R. A. Rolfe (*Bot. Mag.* tab. 8216).—*Nat. ord. Orchidaceae*; tribe *Epidendreae*. Malay Peninsula. Epiphyte with a long creeping rhizome; leaves petioled, 4½–8 inches long; flowers large, greenish-yellow; sepals dotted and petals striped with purple-brown; lip purple.—*G. H.*

Cabbage-root Maggots. By W. J. Schoene (*U.S.A. Exp. Stn. N.Y., Bull.* 801; March 1908; figs.).—The author recommends that to prevent the attacks of the cabbage-root maggots (*Phorbia brassicae* and *P. fusciceps*) the seed beds should be protected by fly-proof screens of cheese-cloth. The results of experiments along these lines are detailed. The beds are made in rough wooden frames about 12 inches high, and, as soon as the seedlings appear, the cheese-cloth is stretched over the frames and kept on until about a fortnight before it is desired to transplant. The method proved entirely successful, and the removal of the screen for this length of time enabled the plants to become sufficiently hardened, so that they did not suffer from wilting when they were transplanted.—*F. J. C.*

Cacao Industry (*Jour. Imp. Dep. Agr. W.I.* vol. ix. No. 2; 1908).—Papers read and discussions thereon at the West Indian Conference, 1908, are reported in detail:—

“Results of Recent Experiments with Cacao in the West Indies.”

“The Characters of Criollo Cacao,” by J. H. Hart, F.L.S.

“The Improvement of Cacao Planting in the West Indies,” by J. H. Hart, F.L.S.

“Fungus Diseases of Cacao and Sanitation of Cacao Orchards,” by F. A. Stockdale, B.A., F.L.S.—*M. C. C.*

Caesalpineia japonica. By T. A. Sprague (*Bot. Mag.* tab. 8207).—Nat. ord. *Leguminosae*; tribe *Caesalpineae*. Japan and China. Shrub 6 feet high; leaves bipinnate; racemes 9 inches long, with about thirty flowers; corolla lemon-yellow.—*G. H.*

Campanula Waldsteiniana. By E. Wocke (*Die Gartenw.* lx. p. 709; Nov. 21, 1908).—A late spring or summer flowering species, and one of the smallest and prettiest of the genus. It forms little bushes or tufts on wiry stems, with small canescent leaves and erect, short, tubular, campanulate, pale blue flowers.—*G. R.*

Chemistry: Simple Exercises illustrating Application to Agriculture. By K. L. Hatch (*U.S.A. Dep. Agr., Off. Exp. Stn., Bull.* 195; January 1908).—A number of very simple chemical experiments suitable for use in elementary schools.—*F. J. C.*

Chinch Bug. By F. M. Webster (*U.S.A. Dep. Agr., Bur. of Entom., Bull.* 69; June 1907; 18 figs.).—Bulletin 15 of this series contained an account of all that was known up to the date of its publication concerning the chinch bug; the present paper is a thorough revision of that account. The insect (*Blissus leucopterus* Say) is the cause of enormous pecuniary losses. It is gregarious, and feeds upon all kinds of grain plants and various other grasses, except perhaps *Poa pratensis*. It is sometimes found feeding on *Polygonum Convolvulus*. The monograph, which runs to ninety-five pages, deals exhaustively with all aspects of the insect's life and habits and with methods of control. This species does not appear to be known outside North America, but there are European species of the same genus which are very destructive.—*F. J. C.*

Clematis 'Mad. Yvette Henry' (*Jour. Soc. Nat. Hort. Fr.* June 1908, p. 244).—This is said to be a very pretty double blue clematis and to have the advantage of remaining double all through the season, which is not the case with all double clematises. The variety was produced by Messrs. Henry of Orleans.—*M. L. H.*

Codlin Moth, Spraying for. By A. Melander (*Journ. Econ. Entom.* i. 3, pp. 217-220; June 1908).—Under the title of "Filling the Calyx-Cup" the author deals with the main cause of failure in completely controlling the codlin moth in the orchards of the Eastern States. He attributes the partial failure to the use of mist-like sprays which cannot penetrate into the calyx-cup sufficiently far, for, as has been pointed out frequently, it is here that the larvæ feed when first they are hatched. He contends that the spray should be arsenate of lead (1 lb. to 50 gallons), which should be rained down in a coarse spray at a pressure of from 200 to 800 lb. to the square inch, until the trees are drenched, so as to ensure that the cup of the calyx is quite filled.

F. J. C.

Columnnea magnifica. By G. T. Grignan (*Rev. Hort.* August 16, 1908, pp. 366-7; coloured plate).—Brilliant scarlet blossoms on spikes resembling large *Salvia patens* flowers, very attractive; requires warm temperate house, and peaty well-drained soil.—*C. T. D.*

Columnnea magnifica. By B. Wercklé (Costa Rica) (*Rev. Hort.* November 16, 1908; p. 527-8). This plant is an epiphyte on trees at high elevations near the snow line; needs full sun and open fibrous (Polypods) soil. Some species thrive above the frost line. Habit erect long flowering.—*C. T. D.*

Columnnea magnifica. By T. A. Sprague (*Bot. Mag.* tab. 8225).—Nat. ord. *Gesneriaceae*; tribe *Columnneae*. Central America. Herb, 1 foot high; leaves oblong, acute, 1-2½ inches long; flowers solitary; corolla flame-coloured, 2½ inches long.—*G. H.*

Coniferous Seedlings, Damping-off of. By L. R. Jones (*U.S.A. Exp. Stn., Vermont, Ann. Rep.* 1906-7, pp. 342-347).—Considerable loss has occurred among coniferous seedlings in the nursery owing to damping off. The attack occurs during the early stages of growth immediately following germination: the tissues of the stem become brown and shrivel at or below the soil-level, and the weakened plant falls over and withers. In a seed-bed where plants had previously damped off 90 per cent. of the seedlings died, while in another portion of the same field practically none died. An attempt was made to check the disease by watering the soil with formalin solution of different strengths. The result was as follows (the plots each measured 16 square feet):—Plot 1, number of seeds germinating on untreated plot, 3,200; plot 2, watered with 10 quarts of ½ per cent. formalin solution, 2,400; plot 3, watered with 10 quarts of 1 per cent. formalin solution, 1,700. At the end of the season there were on plot 1, 320 plants; on plot 2, 2,190 plants; on plot 3, 1,570 plants—indicating

the benefit likely to be derived from the use of formalin. The European practice of sanding the seed-bed was followed with fair results, and experiments are in progress with sprays applied just after germination.—*F. J. C.*

“Corky Scab” of Potatos (*Journ. Bd. Agr.* xv. p. 598; November 1908; 1 plate).—“Corky scab” is the name applied to that form of scab characterized at first by small dark-coloured slightly raised patches on localized areas of the surface of the tuber. The blister is afterwards ruptured, and the brown or snuff-coloured spore-balls are exposed. If the tubers are in a wet situation the parasite, now called *Spongospora scabies* Mass. (= *Tubercinia scabies* Berk. and *Sorosporium scabies* Fisch. and Waldh.), develops further and causes the formation of large cavities up to half an inch in depth; but if in a dry situation the affected area is cut off from the sound by a large development of cork, whence the name. The planting of diseased tubers should be avoided. Several other forms of scab are known.—*F. J. C.*

Corytholoma macropodium. By T. A. Sprague (*Bot. Mag.* tab. 8228).—Nat. ord. *Gesneriaceae*; tribe *Sinningieae*. South Brazil. Herb 6-9 inches high; leaves suborbicular, 3-5 inches in diameter; flowers subumbellate, pendulous; corolla cinnabar-red; tube 1 inch long.
G. H.

Cotton Industry. West Indian Agricultural Conference, 1908, Report of Papers (*Jour. Imp. Dep. Agr. W.I.* 1908, vol. ix. No. 3).

“Recent Results in the Cultivation of Cotton in Barbados,” by J. H. Bovell, F.L.S.

“Recent Results of Cultivation of Sea Island Cotton in St. Vincent,” by W. N. Sands.

“Cotton Cultivation in British Guiana,” by Professor J. B. Harrison, C.M.G.

“Progress of Sea Island Cotton Industry in the West Indies,” by Thomas Thornton, A.R.C.S.

“Experiments on the Improvement of Cotton by Seed Selection in the Leeward Islands,” by Dr. Francis Watts, C.M.G.

“Treatment of Cotton Pests in West Indies,” by H. A. Ballow, with figures.—*M. C. C.*

Cotton-root Rot of Texas. By C. L. Shear and George F. Miles (*U.S.A. Dep. Agr. Bur., Pl. Ind., Circ.* 9; May 1908).—This root rot is caused by *Ozonium omnivorum*, which infests the soil. A combination of rotation of crops, and deep fall ploughing will probably be found the most satisfactory, efficient, and practicable means of controlling the root rot of cotton.—*M. C. C.*

Cover Crops in Orchards. By E. J. Delwiche and J. G. Moore (*U.S.A. Exp. Stn. Wisconsin, 24th Ann. Rep.,* 1907, p. 379).—Cover crops are used: “(a) To prevent deep freezing of the ground and thus avoid root-killing of the trees; (b) to hasten the ripening of late wood growth, and in a measure prevent top-killing; (c) to prevent the soil from

being washed away by heavy fall and spring rains; (d) to hold soluble plant food in the soil, especially nitrates; (e) to lessen evaporation in winter when no snow is on the ground; (f) to add humus to the soil so as to increase its water-holding capacity; (g) to prevent snow from being blown away; (h) to add nitrogen to the soil." Ten plants were experimented with as cover crops—viz., cow pea, soy bean, crimson clover, hairy vetch, Canadian field pea, oats, rye, millet, and rape—and some of these were used in combination. It was found most easy to get a catch crop with oats, rape, rye, and millet, and least with soy bean, crimson clover, and hairy vetch. The relative order of value in obtaining early cover was: cow peas, soy bean, oats, Canadian field peas, rape, rye, millet, turnip, hairy vetch, and crimson clover. Cow peas were found to withstand drought best, millet least. Field peas resisted shade best, turnip least. Hairy vetch and crimson clover withstood trampling best, while turnips suffered the most. Frost injured rye and crimson clover the least, soy beans and cow peas suffered the most. Turnips, oats, and field peas lowered the moisture content of the soil to the greatest extent during the late summer, while crimson clover and soy beans proved to be the most efficient holders of moisture during the winter, and millet and field peas the least. All cover crops reduced the depth of freezing to about one-half.—F. J. C.

Cranberry, Insects Injurious to, in 1907 (*U.S.A. Exp. Stn. Wisconsin, 24th Ann. Rep.*, 1907, p. 809).—The most injurious insects were the caterpillars of *Rhopobota vacciniana* (the black-headed vine-worm), *Teras minuta* (the yellow-headed vine-worm), and *Mineola vaccinii* Riley (the fruit-worm). Several other injurious insects are mentioned and methods of control suggested.—F. J. C.

Cranberry Investigations. By A. R. Whitson and O. G. Malde (*U.S.A. Exp. Stn. Wisconsin, 24th Ann. Rep.* 1907, p. 302).—Drainage was followed by a marked increase of crop, but it is pointed out that the depth of drainage must depend largely upon the nature of the subsoil. The application of phosphate and nitrate and of potash and nitrate to the bogs has proved highly beneficial. Experiments have been carried out with the object of destroying moss; sphagnum was destroyed by a dressing of air-slaked lime, but other mosses remained. The application of a solution of common salt at the rate of fifteen pounds to fifty gallons of water has been found a safe and efficient method of destroying all.

F. J. C.

Crown-gall, The Cross Inoculation of Fruit Trees and Shrubs with. By G. G. Hedgcock (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 181; August 1908).—The identity of "crown-gall" occurring upon almond, apricot, blackberry, cherry, peach, plum, prune, chestnut, and walnut has been established by experiments with nearly 5,000 seedlings grown in sterilized soil, watered with sterile water and inoculated with pieces of gall taken from portions of the plants mentioned. Further experiments on 15,000 seedlings in the field indicate that the soft galls on apple, pear, and rose are also forms of the same disease. The author considers that either *Bacillus tumefaciens* Sm. and Town., the cause

of the formation of galls on peach and the Paris daisy, or an allied form, is the cause of these soft galls. It was found that the soft galls from the almond, apricot, blackberry, cherry, peach, plum, prune, and raspberry have been easily transferred to seedlings of almond, apricot, peach, and raspberry; less readily to blackberry, cherry, plum, prune, and pear; and with great difficulty to apple, chestnut, walnut, and rose; those of the apple, chestnut, walnut, rose, and pear have not been readily transferred to any of the other plants. The hard gall of these fruit trees does not appear to be contagious.—*F. J. C.*

Cucumbers, Influence of "Bottom Heat" in Forcing (*U.S.A. Exp. Stn. Wisconsin, 24th Ann. Rep. 1907, p. 355*).—Experiments were conducted to ascertain the best soil temperature for the production of the crop; the factors which were taken as determining which were the best results were earliness, relative number of male and female flowers, and relative effect on growth and vigour of plants. The temperature employed ranged from 70°·8–83°·3 F. The best soil temperature for productiveness proved to be 73°–75° F., and it was found that the earliness and number of flowers produced were influenced but slightly by the increase of soil temperature. The experimenters consider that individual differences in the plants are important factors in determining the results obtained.—*F. J. C.*

Cut Flowers, Preservation of. By V. Ducomet and L. Fourton (*Rev. Hort.* July 16, 1908, pp. 333–6).—A very interesting record of experiments with various solutions adapted to various species of flowers, with full details.—*C. T. D.*

Cytisus decumbens. By J. Hutchinson (*Bot. Mag.* tab. 8230).—Nat. ord. *Leguminosae*; tribe *Genisteae*. South Europe. Shrub 4–8 inches high, procumbent; leaves unifoliate; flowers solitary or two to three together, yellow.—*G. H.*

Dicentra (Delytra) tor losa. By D. Bois (*Rev. Hort.* September 1, 1908, pp. 393–4).—A pretty climbing species with golden-yellow flowers, followed by attractive red berries, showing shining black seeds on a white ground when ripe. Annual, sown in the open, flowers in August; for earlier flowering sow in March or April under glass and plant out in June.—*C. T. D.*

Echinops Tournefortii. By W. B. Hemsley (*Bot. Mag.* tab. 8217).—Nat. ord. *Compositae*; tribe *Cynaroideae*. Armenia and Persia. Perennial, 3–5 feet high; leaves large, pinnately divided, 1–1½ foot long; flower-heads globose, 2½–3 inches or more in diameter; corolla white.—*G. H.*

Eria hyacinthoides. By R. A. Rolfe (*Bot. Mag.* tab. 8229).—Nat. ord. *Orchidaceae*; tribe *Epidendreae*. Java. Epiphyte, 1 foot high; leaves 8–12 inches long; peduncles 4–6 inches long; flowers white, ¾ inch long.—*G. H.*

Essential Oils: Notes on Lemon Grass, Bay Leaf, and Camphor. By Dr. Francis Watts and H. A. Tempany (*Journ. Imp. Dep.*

Agr. W. I. vol. ix. No. 3 ; 1908, p. 265).—Detailing the results of experiments in the extraction of essential oils consequent on the erection of a small still at the Botanic Station, Antigua, ending with the suggestion of a simple form of still for the extraction of essential oil from such material as lemon grass, bay leaves, and the like.—*M. C. C.*

Eucryphia cordifolia. By O. Stapf (*Bot. Mag.* tab. 8209).—Nat. ord. *Eucryphiaceae*. South Chili. Tree 40 feet high ; trunk 1-2 feet in diameter ; leaves broad-oblong, 2-3 inches long ; flowers solitary ; petals four, obovate-rotundate, 1 inch long, milk-white.—*G. H.*

Eupatorium Raffillii. B. W. B. Hemsley (*Bot. Mag.* tab. 8227).—Nat. ord. *Compositae* ; tribe *Eupatorieae*. Central America (?). Shrub 1½-3 feet high ; leaves opposite, 4½-6 inches long ; flower-heads numerous, 1 inch across, in compressed clusters, 4-6 inches across, rose-coloured.

G. H.

Evergreen Trees of Colorado. By B. O. Longyear (*Colorado Agr. Exp. Stn., Bull.* 130 ; May 1908).—This is by far the most exhaustive account of the coniferous trees of Colorado that has yet appeared, and the beautiful and accurate illustrations still further add to the general value of the work.

To English growers the work must also appeal, for every species thrives well in this country. Colorado possesses five species of *Pinus*, two spruces, two silver firs, two junipers, and the now well known and justly valued Douglas fir.

The cone of the foxtail or hickory pine (*Pinus aristata*) can hardly be distinguished from that figured in the Gardeners' Chronicle some years ago as collected by the present writer near Berkhamsted, in Herts. It is truly a curious and interesting species. The nut pine, the seed of which is so largely used in confectionery in this country, is well described and illustrated.—*A. D. W.*

Ferns, Effect of Light upon the Germination and Gametophyte of. By A. C. Life (*Rep. Miss. Bot. Gard.* 1907, pp. 109-122).—Spores, it is found, do not as a rule germinate in darkness. Weaker light produces ribbon-like prothallia, stronger light heart-shaped ones. Weak light inhibits the production of archegonia and favours that of antheridia. A history and bibliography of the question is given.

G. S. B.

Forest Planting Leaflet (*U.S.A. Dep. Agr., Forest Service, Circ.* 61, revised edition).—There is much information of a sound and practical nature contained in this leaflet, not only as how most successfully to transplant forest trees, but also as to the proper season, puddling, heeling in, treatment before transplanting, and transplanting in nurseries. To those about to form young plantations in this country the information should not come amiss, for the various operations are well and clearly described.—*A. D. W.*

Forest Service, The : What it is, and how it Deals with Forest Problems (*U.S.A. Dep. Agr., Forest Service, Circ.* 86 ; 4th edition).—

Describes the United States Forest Service, every branch of which is treated of in a concise and thoroughly practical manner. On comparing the present system of organizing the forest service with what is in vogue in this country, one cannot but be struck by the vast dissimilarity of the two methods, though no doubt the vastness of the States' forests has much to do with the necessity for such elaborate rules and conditions.

A. D. W.

Forest Tables : Western Yellow Pine. Compiled by E. A. Ziegler (*U.S.A. Dep. Agr., Forest Service, Circ. 127*).—The yellow pine includes not only *Pinus ponderosa*, but *P. jeffreyi* as well, no attempt being made to segregate the species, since the distinction is too slight to be worthy of recognition. The variations in the development of the yellow pine, as recorded in the tables given, is mainly brought about by the widely varying factors of temperature and rainfall in different parts of the pine regions. All the tables are highly interesting, and are evidently the outcome of much careful research and compilation.—A. D. W.

Forestry in Ohio and Vermont (*Ohio Agr. Exp. Stn., Bulls. 188, 189, and 190; Vermont Agr. Exp. Stn., Bull. 182*).—One of these pamphlets deals with "Evergreens, their Use and Culture," another with "Forest Conditions in Ohio," while a third is entitled "Forestry Suggestions." "Forest-planting in Vermont" is the title of that issued at the Vermont University—a concise, well-written pamphlet which deals with the best kinds of trees to plant, where to plant, methods of planting, and starting trees from seed. "Forestry Suggestions" also contains much valuable information, in addition to which there are several well chosen illustrations of forest growth under varying circumstances. The pamphlet on "Evergreens, their Uses and Culture" is too valuable a publication to be passed unnoticed. Though only of 102 pages, a vast amount of most useful information has been crammed into the space, and the numerous illustrations—eighteen in number—are well reproduced and of great value to the text.

In perusing these forestry pamphlets of the United States one cannot but feel sorry that we in this country are so far behind in similar methods of woodland demonstrations.—A. D. W.

Forestry : Management of Second Growth in the Southern Appalachians. By Raphael Zon (*U.S.A. Dep. Agr., Forest Service, Circ. 118*).—Now that a timber famine is imminent the management of woodlands all over the world is daily receiving more attention. From this carefully compiled circular it would appear that in the Southern Appalachians, where from 80 to 85 per cent. of the timber is second growth, the perpetuation of this supply has become one of the most vital problems of the region. The changes recommended are: (1) closer economy in the use of the forest, (2) adaptation of the species and sizes to specific uses, (3) more careful methods of logging, (4) longer intervals between cutting, and (5) adequate protection of the forest. Under the present well-organized system of management we may rest assured that everything possible will be done to utilize the forest lands to their utmost extent.—A. D. W.

Forestry, Various (*Quarterly Journal of Forestry*, 1908).—To those interested in forestry the *Journal of Forestry* of the Royal English Arboricultural Society will prove interesting, containing as it does many excellent articles on our woodlands and timber. The article on "Taxation of Woodlands" in the January number will open the eyes of many to this important, but not at all well-known, question. Under the heading of "Present Condition of Irish Woodlands" much information is given as to the ruthless manner in which timber is being felled, particularly on farms and on small estates. The generally wretched condition of the Irish woods and plantations and the wholesale cutting down of timber since the Land Purchase Act of 1903 came into force are to be deplored, and formed the subject of several notes by the writer in our British timber journals.

The "Planting of Sand-dunes at Holkham" is a practical paper that should be read by everyone who has the charge of tree cultivation in maritime districts to carry out.

Two at least of the articles contributed to the July number of the *Journal of Forestry*—that on "The Conversion of Underwood and Coppice with Standards into High-wood" and "Volume of some Coniferous Timber Crops per acre in the County of Durham"—are of particular interest to the British forester, containing much that is of real practical value in connection with the management of our woodlands. Such information as that on the volume of timber produced from an acre is something new, and will be read with much interest by everyone who has to deal with the economic side of the question of timber production.

Surely information for the *Journal* was scant when so many pages are devoted to the paper on "Working Plans of Stisted Hall Woodlands," which, as everyone knows, could only be of real interest to the owners and managers of the woods in question.

The prices of home-grown timber as recorded are both interesting and valuable, and should if practicable be widely extended. Much other useful information is given in both volumes.—*A. D. W.*

Forestry (*Transactions of the Royal Scottish Arboricultural Society*, January and July 1908).—Though much of the July number is taken up with matter that is of more interest to the Continental than to the British forester, yet several of the papers, such as that on "Impressions of Forestry in the Schwarzwald" and "Experiments on Relative Value of Timber Preservatives," by Professor Henry, are of immense importance to those who have the conversion of our home-grown timbers to attend to. The result of the experiments in connection with preservation would point to the fact that, despite one or two drawbacks, carbolineum is probably the most useful of the many so-called preservatives that have been recommended.

The scheme for establishing a national industry of forestry is a laudable one, and it is to be hoped that at no very distant date some, at least, of the suggestions made will be carried out.

"The Douglas Fir as a Commercial Tree" is a readable article, and contains much sound advice and reasoning, although at the same time

we have our doubts, from a very varied knowledge of the tree, as to its value in a purely economic sense.

A good account of the Inverleiner State Forest is given by Mr. Munro Ferguson, M.P.—A. D. W.

Frost Injuries to Sycamore Buds. By Hermann von Schrenk (*Rep. Miss. Bot. Gard.* 1907, pp. 81-88; 1 plate).—Heavy late frosts in April and May kill the young leaves and buds; but the latter are so replaced by adventitious buds that no permanent injury need result.

G. S. B.

Frost Resistance in Beans, Breeding for. By F. W. Card (*U.S.A. Exp. Stn. Rhode I., Rep.* 1907, pp. 220-225).—Experiments were commenced some years ago with the object of obtaining a strain of beans which would be frost-resistant. The seed was selected each year from plants which withstood the greatest degree of cold without injury; but it is concluded, as the result of the experiment, that this method is not likely to lead to any good result in that direction.—F. J. C.

Fruit-growing in Illinois (*U.S.A. State Hort. Soc. Illinois, Ann. Rep.* 1906).—The greater part of this report (500 pp.) is occupied by the papers and discussions at the meetings of this society, and the major portion concerns fruit-growing in the open. Various members read papers, and apparently animated discussions are raised upon the papers read. Lists of fruits approved for cultivation in the various sections of the State are given.—F. J. C.

Fruit-growing in Missouri (*U.S.A. State Hort. Soc. Missouri, Ann. Rep.* 1906).—Like the preceding, mostly occupied by reports upon various aspects of fruit-growing. Such familiar problems as the grading, packing, and marketing of apple, spraying for a variety of diseases, the treatment of nursery stock to ensure freedom from insect and fungus pests, and dust *versus* liquid spraying (in this report dust spraying is praised—an unusual circumstance) are fully treated of.—F. J. C.

Fruit-preserving for Farmers. By William Jaques (*N.Z. Dep. Agr., Div. Biol. and Hort., Bull.* 19).—A very complete manual on the art of bottling fruits which might be studied with advantage by many housekeepers whose preserving of fruit stops short at making jams and jellies.—M. L. H.

Fruit Trees in Pots. By M. Paul Lécotier (*Jour. Soc. Nat. Hort. Fr.* June 1908, p. 289).—It is suggested that the fruit trees now so successfully grown in pots might be a great source of pleasure to amateurs who have only a balcony or verandah at their disposal, and have hitherto restricted themselves to palms, oleanders, &c.—M. L. H.

Fungus Diseases of Scale-insects and Whitefly. By P. H. Rolfs and H. S. Fawcett (*U.S.A. Exp. Stn. Florida, Bull.* 94; July 1908; with 20 woodcuts).—This bulletin records the experiments made in Florida in the introduction into the orchards of fungus diseases which attack the scale-insects and whitefly. The six fungi discussed in this

bulletin have been known for years and used successfully. They are named *Sphaerostilbe coccophila* (Tul.), *Ophionectria coccicola* (E. & E.), *Myriangium Duriaei* (Mont.), *Aschersonia flavo-citrina*, *Aschersonia aleyrodes* (Webber), and the brown fungus—which has not yet received a scientific name. Each fungus is recorded with the insects specially affected, and how it is to be applied.—*M. C. C.*

Furcraea, Literature and Synopsis of. By J. R. Drummond (*Rep. Miss. Bot. Gard.* 1907, pp. 25–75 ; 4 plates).—An epitome prepared at Kew, giving the history, distribution, and synonymy of ten admitted species and six others “imperfectly known but possibly valid.”—*G. S. B.*

Goldenseal : its Cultivation and Handling. By Alice Henkel and G. F. Klugh (*U.S.A. Dep. Agr., Bur. Pl. Ind., Circ.* 6 ; June 1908 ; figs.).—A description of this drug plant (*Hydrastis canadensis*) is given, and methods of its cultivation and the preparation of the root for market are detailed. The demand for the root amounts to from 200,000 lb. to 300,000 lb. annually, but it is pointed out that the point of over-production might easily be reached.—*F. J. C.*

Grafting, Chemical Changes in Scions. By L. Damel (*Rev. Hort.* October 1, 1908, p. 459).—Experiments by Professor Ch. Laurent have shown by analysis of ashes that grafted plants are affected in their chemical constituents by the stock, and *vice versa*. Belladonna grafted on tomato resulted in its particular alkaloid being detected in the latter, which normally is entirely free. It was also demonstrated that differences in chemical constitution were correlated with different resistance to fungoid disease, a point of great practical importance.—*C. T. D.*

Hardiness of Plants. By Jules Rudolph (*Rev. Hort.* August 16, 1908, p. 372).—Capacity to stand frost depends considerably upon the source of the seed in the case of somewhat tender vegetables, seed from a cold country yielding harder offspring, and *vice versa*.—*C. T. D.*

Hevea brasiliensis, Fungi of (*Die Pilze von Hevea brasiliensis—Para Kautschuk*). By T. Petch (*Zeit. f. Pflanzkr.* (1908), xviii. 2, 81).—The fungi known to attack this plant, which has lately become so important as a producer of rubber, are dealt with under the headings of “Leaf Diseases,” “Root Diseases,” “Stem Diseases,” “Fruit Diseases.” One fungus, *Eurotium candidum*, is described as affecting the prepared rubber.—*F. J. C.*

Hibiscus aponeurus. By T. A. Sprague (*Bot. Mag.* tab. 8231).—Nat. ord. *Malvaceae* ; tribe *Hibisceae*. Tropical East Africa. Plant erect, shrub-like, 1–4 feet high ; leaves ovate, 1–1½ inch long ; flowers solitary, axillary ; corolla 1 inch diameter, brilliant scarlet.—*G. H.*

Honey and Pollen-yielding Plants in Texas. By A. F. Conradi (*Jour. Econ. Entom.* i. 3 ; pp. 191–203 ; June 1908).—A list of many plants grown in Texas, with notes on the yield of honey and pollen from each, the time of flowering, and the distribution of the plant through the State of Texas.—*F. J. C.*

Horticulture in U.S. America (*U.S.A. Soc. Amer. Florists and Ornam. Horticulturists, Rep. 22nd Conv. 1906*).—The convention of 1906 met at Dayton, Ohio. The report contains an account of the business proceedings of the Society, and prints the papers read and discussions which took place at the meeting. The papers and discussions were upon "Reform of Postal Rates," "Teaching Horticulture in Public Schools," "The Ideal Private Gardener and his Work," and "Reform of Tariff on Glass."—*F. J. C.*

Hydrastis canadensis, Germination of. By H. Hus (*Rep. Miss. Bot. Gard. 1907*, pp. 85-94; 1 plate).—A description of experiments as to the most favourable conditions for the propagation by seed of the Golden Seal of the United States Pharmacopœia. Fresh seed and a uniformly moist soil protected from extremes of temperature are essential.—*G. S. B.*

Indigofera hebeptala. By D. Prain (*Bot. Mag. tab. 8208*).—*Nat. ord. Leguminosae. Himalaya.* Considerable shrub; leaves, petiole 7-8 inches, pinnate; leaflets $1\frac{1}{2}$ - $2\frac{1}{2}$ inches long; racemes twenty to forty flowered; flowers with dark crimson standard and rose-coloured petals.

G. H.

In-breeding in Corn. By E. M. East, Ph.D. (*U.S.A. Exp. Stn. Conn., Bien. Rep. 1907-8*; pp. 419-428).—The author reviews the changes in method adopted in breeding maize during the past decade and the principles underlying the process of improving the plant. The idea that the constant selection of fluctuating variations would yield improved races has had to be abandoned, for it is found that when constant selection of the extreme variation is carried out there is at least a tendency to return to the race average rather than to the average of the selected seed parents. The author considers that it is better to breed, not by selecting one individual, but by selecting several of the best yielding types and keeping the race at its best by selecting fluctuations and giving them the best possible environment.—*F. J. C.*

Insects, Uniform Common Names for. By A. F. Burgess (*Jour. Econ. Entom. i. 3*; pp. 209-219).—Suggestions for the use of uniform common names for insects—a consummation devoutly to be wished but difficult of attainment. Meanwhile it would be well always to ensure that the scientific name of the insect under discussion is quoted, which, unfortunately, is not always the case even in the publication containing this paper.—*F. J. C.*

Larch Saw-fly, The Large. By C. G. Hewitt (*Jour. Bd. Agr. xv. 1908*, p. 649; 4 figs., 1 map).—This pest (*Nematus erichsoni*) has been dealt with in the *Journal of the Board of Agriculture* xiii. (1906), pp. 885-894, and this paper describes its present distribution in this country and supplements the former paper by detailing the life-history, parasites, and natural enemies of the pest. The attack is at present confined to the Lake District. Remedial measures, especially spraying with arsenite of copper at the rate of 1 lb. to 150 gallons of water, and handpicking (the larvæ feed close together) are suggested. Various birds

devour the larvæ, and they are eaten by the field vole (*M. agrestis*) in the winter.—*F. J. C.*

Lewisia Cotyledon. By W. B. Hemsley (*Bot. Mag.* tab. 8220).—Nat. ord. *Portulacaceae*. North America. Perennial herb, stemless; leaves fleshy, rosulate, $1\frac{1}{2}$ – $2\frac{1}{2}$ inches long; flower-scapes 4–5 inches high, 8–12 flowered; flowers $1\frac{1}{4}$ inch diameter, white, with crowded red lines.—*G. H.*

Lime-sulphur Wash, Dipping of Nursery Stock in. By P. J. Parrott, H. E. Hodgkiss, and W. J. Schoene (*U.S.A. Exp. Stn. Geneva, N.Y., Bull.* 802; April 1908).—Comparisons between the effect of dipping trees in the lime-sulphur wash, various miscible oils, kerosene emulsion, and treatment with hydrocyanic acid gas for the destruction of San José scale are reported. Note is also made of the effect upon the trees. Attention was directed in the main towards the effect of the lime-sulphur wash (of standard strength), and it was found that immersion of the trees therein at temperatures ranging from 60°–120° F. for different times up to ten minutes, gave very variable results as regards the scale, but immersion at 212° F. killed the scale. The buds and bark were so severely injured at 212° F. that the trees were ruined. Immersion of the roots in this wash was usually followed by more or less severe injury at all temperatures; but immersion of the tops at temperatures up to 120° F. entailed no injury to the trees. Nurserymen are recommended to continue the use of hydrocyanic acid gas as a fumigant in preference to this as a dip.—*F. J. C.*

Meconopsis sinuata var. *latifolia*. By D. Prain (*Bot. Mag.* tab. 8223).—Nat. ord. *Papaveraceae*; tribe *Eupapaveraceae*. Himalaya. Herb 1–4 feet high; leaves many, radial, soon disappearing; flowers in raceme-like cymes; petals 4, blue, $1\frac{1}{2}$ inch long and $1\frac{1}{4}$ inch wide.—*G. H.*

Mendelism in Corn Breeding, Practical Use of. By E. M. East, Ph.D. (*U.S.A. Exp. Stn. Conn., Bien. Rep.* 1907–8; pp. 406–418).—It is found that in the characters which are concerned in the selection of a marketable type of maize the dominant character is completely dominant. Thus “flint” is dominant over “sweet,” “flint” over “dent,” “dent” over “sweet,” “purple” over “no purple or white,” “yellow” over “no yellow or white,” “red” over “no red or white.” The occurrence of xenia permits of early selection of the character desired, and rejection of hybrid seeds where necessary. The law of segregation is found to work out, and more important still, from a practical point of view, the law of purity is found to be constant, so that a variety having a combination of two of certain of the characters mentioned above will be able to be selected out in the second year and bred true in each following generation if kept from chance crossing.

F. J. C.

Moisture Equivalent of Soils. By L. L. Briggs and J. W. McLane (*U.S.A. Dep. Agr., Bur. Soils, Bull.* 45; September 1907).—By the “moisture equivalent of soils” is meant the maximum percentage of

water which a soil will retain when in equilibrium with a definite force. The soil is first thoroughly moistened and then placed in the perforated cups of a centrifugal machine, where it is subjected to a constant centrifugal force until it ceases to lose water. The percentage of water remaining is then determined. By this means is ascertained the moisture contents which soils must have in order to make it equally difficult to remove a very small additional amount of moisture from any of the soils. Thus, using a centrifugal force equal to 8,000 times the force of gravity, it was found that the moisture equivalents varied from 8.6 per cent. in the coarser sandy soils to 46.5 per cent. in the heavy clay subsoils. For this force organic matter has a retentive power no greater than that of clay.—*F. J. C.*

Mussaenda erythrophylla. By W. B. Hemsley (*Bot. Mag.* tab. 8222).—Nat. ord. *Rubiaceae*; tribe *Mussaendaceae*. Tropical Africa. Shrub to 40 feet high; leaves 6–7 inches long; calyx-lobes all $\frac{1}{3}$ – $\frac{1}{2}$ inch long, or one, leaf-like, 5 inches long by 4 inches broad, brilliant crimson; corolla salver-shaped, 1 inch in diameter, yellow or rose.—*G. II.*

Odontoglossum Cervantesii, Abnormal. By H. Hus (*Rep. Miss. Bot. Gard.* 1907, pp. 95–97; 1 plate).—A description of several flowers, abnormal in the number of floral leaves and anthers produced, and in the presence of colour in the column, produced by the same plant in successive seasons.—*G. S. B.*

Olive Tubercle Organism, Recent Studies of the. By E. F. Smith (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 181, Part IV.; August 1908).—This disease, prevalent in California, causes swellings on the branches of olive. The swellings are the result of the attack of a bacillus, and this paper gives an account of the studies carried out upon the organism. He considers it best to coin a new name for the organism on account of the confusion surrounding the present names, and proposes *Bacillus Savastanoi* (syn. *B. oleae tuberculosis*). A careful diagnosis and account of cultural characteristics is given, and an account of infection experiments. The author is unable to confirm the conclusion reached by C. O. Smith that this organism is the cause of the tubercle of oleander. The latter he believes to be caused by *B. tumefaciens* (see "Crown-gall"). *B. Savastanoi* does not produce tubercles on *Chrysanthemum frutescens*.—*F. J. C.*

Orchid Portraits.—The following orchids have been figured recently:—

*Brasso-Cattleya Cliftonii . . . *Gard. Mag.* 1908, p. 948.

*B. Madame Hye

*B. Queen Alexandra, Glenthorne
var.

Bulbophyllum galbinum . . . *Bot. Mag.* t. 8216.

*Calanthe × Angela

*Calanthe × Norman

Catasetum Claesianum . . . *Gard. Chron.* 1908, ii. p. 211,
fig. 90.

- *C. *Russellianum* *Journ. Hort.* 1908, ii. p. 315.
Cattleya Bowringiana *Orch. Rev.* 1908, p. 337, fig. 43.
 *C. \times *Clarkiae*
 *C. *Harrisoniae alba*, Stanley's var. *Garden*, 1908, ii. p. 488; *Journ. Hort.* 1908, ii. p. 291.
 *C. \times 'Fabia' *Cooksoniae* . . .
C. labiata Roehrsiana *Orch. Rev.* 1908, p. 281, fig. 38.
C. Loddigesii (monstrous) . . . *Rev. Hort. Belge*, 1908, p. 308.
 *C. \times *Maroni aurea* *Gard. Mag.* 1908, p. 719.
 *C. \times *Rhoda* *Gard. Mag.* 1908, p. 685.
 *C. \times *Rutilant* *Journ. Hort.* 1908, ii. p. 863.
 *C. \times *Venus* *Gard. Chron.* 1908, ii. p. 258, fig. 112; *Gard. Mag.* 1908, p. 751.
C. Schröderae *Journ. Hort.* 1908, ii. p. 219.
C. Warszewiczii var. *Frau Melanie Beyrodt* *Journ. Hort.* 1908, ii. p. 267.
Coelogyne Mooreana *Orch. Rev.* 1908, p. 329, fig. 42.
Cynoches Egertonianum . . . *Orch. Rev.* 1908, p. 296, figs. 38-9.
Cymbidium \times *eburneo-Lowianum* *Orch. Rev.* 1908, p. 325, fig. 41.
Cypripedium \times *Actaeus Bianca* . *Gard. Chron.* 1908, ii. p. 261, fig. 114.
 *C. \times *Actaeus Bianca superbum* . *Gard. Mag.* 1908, p. 762.
 *C. \times *Antinous*
C. x Arethusa *Journ. Hort.* 1908, p. 561.
 *C. *Charlesworthii Bromilowianum* *Gard. Chron.* 1908, ii. p. 310, fig. 132; *Journ. Hort.* 1908, p. 469.
 *C. \times *Dante*
 *C. \times *Dreadnought* *Gard. Chron.* 1908, ii. p. 389, fig. 162.
C. x Emperor of India . . . *Journ. Hort.* 1908, ii. p. 421.
C. x Frau Ida Brandt . . . *Orchids*, 1908, p. 133, fig. 22.
C. x insigne Sanderianum . . *Orch. Rev.* 1908, p. 267, fig. 36.
C. x Maudiae *Orch. Rev.* 1908, p. 266, fig. 35.
 *C. \times *Rossetti* *Orch. Rev.* 1908, p. 265, fig. 34.
C. x Sanactaeus etoniense . . *Gard. Chron.* 1908, ii. p. 416, fig. 171.
C. x Thalia var. *Mrs. F. Wellesley* *Orch. Rev.* 1908, p. 273, fig. 37.
 **Dendrobium Brymerianum*, *Gatton Park* var. . . . *Gard. Chron.* 1908, ii. p. 110.
 **D. Coelogyne striatum* . . . *Journ. Hort.* 1908, p. 585.
D. superbum *Rev. Hort.* 1908, p. 458, fig. 177.
Epidendrum costatum . . . *Gard. Chron.* 1908, ii. p. 425, fig. 173.
E. falcatum (*Parkinsonianum*) . *Gard. Chron.* 1908, ii. p. 378.
E. Lambeauianum *Gard. Chron.* 1908, ii. p. 228, fig. 99.
Eria rhynchostyloides . . . *Bot. Mag.* t. 8284.
Habenaria carnea *Orch. Rev.* 1908, p. 305, fig. 40.

- **Laelio-Cattleya Cornelia*, Weston-
birt var.
- **L.-C. Elva*
- **L.-C. Golden Oriole*
- **L.-C. Lustre*
- **L.-C. Ortrude superba*
- L.-C. Rosalind* *Journ. Hort.* 1908, ii. p. 515.
- **L.-C. St. Gothard*
- Miltonia vexillaria* *Gard. Chron.* 1908, ii. p. 184.
- **Odontoglossum* × *Groganiae*
- **O. × Magali Sander*
- O. Pescatorei Sanderæ*. *Gard. Mag.* 1908, p. 785.
- O. Pescatorei*, Westonbirt var. *Gard. Chron.* 1908, ii. p. 249.
- **Odontioda Charlesworthii*, Good-
son's var. *Garden*, 1908, ii. p. 586.
- **Oncidium incurvum*
- **O. bicallosum*, Sander's var.
- Orchis* × (*latifolia* × *maculata*) *Gard. Chron.* 1908, ii. p. 194,
fig. 82.
- Polystacha flexuosa* *Gard. Chron.* 1908, p. 276, fig. 120.
- **Sophro-Cattleya Doris* *Gard. Chron.* 1908, ii. p. 856,
fig. 150; *Journ. Hort.* 1908, ii.
p. 498; *Garden*, 1908, p. 609.
- **Sophro - Laelio - Cattleya* Saxa,
Westonbirt var.
- **Sophro Danae superba* *Journ. Hort.* 1908, ii. p. 339.
- S. Medea* *Journ. Hort.* 1908, p. 633.
- Stanhopea oculata* *Gard. Chron.* 1908, ii. p. 115,
fig. 44.
- **Vanda coerulea Charlesworthii* *Gard. Chron.* 1908, p. 874, fig. 160;
Journ. Hort. 1908, ii. p. 445;
Gard. Mag. 1908, p. 831; *Orch.*
Rev. 1908, p. 361, fig. 44.
- **V. coerulea* var. *R. Chollett*
- Zygocolax Veitchii* *Journ. Hort.* 1908, ii. p. 248.

G. W.

* A painted portrait of those having an asterisk prefixed is preserved in the Royal Horticultural Society's collection.

Orchids of Grenada, West Indies. By W. E. Broadway, Trinidad, West Indies (*Gard. Chron.* 1908, ii. p. 228).—A list and notes of fifty species.—G. W.

Orchids, Transmission of Albinism in. By G. T. Grignani (*Revue Horticole*, 1908, p. 429).—Deals with the behaviour of seedlings from white-flowered plants.—G. W.

Paeony Hybrid, Yellow. By D. Bois (*Rev. Hort.* July 16, 1908, pp. 322-6; 1 illustration).—An interesting hybrid between *P. Delavayi lutea* and *P. Moutan* 'Ville de St. Denis.' Large very double flowers,

colour canary yellow, slightly carmine tinted at tips and sometimes at base of petals; highly recommended.—*C. T. D.*

Para Rubber Seed. By H. F. Macmillan and T. Petch (*Agr. Jour. Roy. Bot. Gard. Ceylon*, iv. 11; May 1908).—It is shown that Para rubber seed very quickly loses its germination capacity on drying, and that the seed from trees which are regularly tapped are smaller and weigh less than those from trees which are not tapped.—*F. J. C.*

Parasites: Value of Introducing Parasites on Beneficial Insects. By Walter W. Froggatt, F.L.S. (*Journ. Imp. Dep. Agr. W.I.* vol. ix. No. 3, p. 262).—Pointing out the value of introducing insects which prey upon the pests that are destructive to economic plants in various countries, but urging that this should be done under the supervision of fully qualified entomologists.—*M. C. C.*

Peach Borer, The Lesser. By A. A. Girault (*U.S.A. Dep. Agr. Bur. Entom., Bull.* 68, Part IV.; October 1907; 4 figs.).—One of the clear-wing moths (*Sanninoidea exitiosa* Say) has been found very commonly attacking peaches, and now a second species is described as doing great damage, viz. *Synanthedon pictipes* G. & R. The damage done is, however, mostly to injured trees; and, following a wound in the bark, the larvæ feed upon the soft tissues of the cambium and the adjacent cells. Two broods are found during the year, and a full life-history and description of their habits are given. It is recommended that every possible means of keeping the tree in good health should be taken, and all wounds should be promptly dressed. The larvæ should be hunted for and destroyed in the spring, and it is necessary to cut away the affected bark to reach them.—*F. J. C.*

Perowskia atriplicifolia (*Die Gartenw.* lxiii., Dec. 12, 1908).—A shrub or sub-shrub of the family Labiatae. It attains a height of about 3 to 4 feet, and has lanceolate silvery leaves and wiry, silvery stems. The flowers are blue and appear from the end of August to October. Well adapted for a dry sunny position.—*G. R.*

Petunia, Dwarf, 'Oeillet Rose.' By G. T. Grignan (*Rev. Hort.* November 16, 1908, pp. 520-1; coloured plate and photos).—A very pretty deep rose, double flower, highly recommended for borders as a dwarf or as pot or basket plant. A long descriptive list of other good varieties is given.—*C. T. D.*

Plant Diseases. Report 1907, by T. W. Kirk, F.L.S. (*Dep. Agr. Rep. N.Z.* October 1907; with 29 plates and numerous woodcuts).—This report includes the occurrence and remedies of plant diseases in New Zealand for 1907, chiefly those already known, both of fungus and insect origin. Then follows a record of the fruit industry, with insect and other parasites, concluding with a report on the New Zealand International Exhibition.—*M. C. C.*

Plant Diseases of Indiana in 1906. By Frank D. Kern (*U.S.A. Exp. Stn. Purdue University*, No. 119, March 1907).—List of the various

plant diseases observed in Indiana during 1906, with statement of cultural methods and the fungicides employed.—*M. C. C.*

Plant Diseases of Vermont. By N. J. Giddings (*U.S.A. Exp. Stn. Vermont, Bull.* 186. Report for 1906-7).—Report containing "Occurrence of Plant Diseases in 1907," a record of "Potato-spraying Experiments," supplemented by an account of "Potato Diseases and their Remedies," "The Damping-off of Coniferous Seedlings," and some minor reports on musk melon industry and Hubbard squash in storage.—*M. C. C.*

Plantae Lindheimerianae, Part III. By J. W. Blankinship. (*Rep. Miss. Bot. Gard.* 1907, pp. 123-228. With portrait of Ferdinand Jacob Lindheimer 1801-1879).—An enumeration with localities and dates of numbers 449-574 in Fascicle III. collected in 1845-6, and of numbers 652-754 of Fascicle IV. of 1847-8, *i.e.* from Compositae onwards, and of species collected by Lindheimer in Comal County in 1849-1851, forming Fascicle V. numbers 652-1288, of which some fifty sets are available for distribution, from the Texas plants in the herbarium of Dr. George Engelmann presented to the Missouri Garden. A biography of Lindheimer, a bibliography of Texas botany, and a complete index to all the three parts of *Plantae Lindheimerianae*, with names conformed to the Vienna Code, are added.—*G. S. B.*

Polystachya Lawrenceana. By R. A. Rolfe (*Bot. Mag.* tab. 8211).—Nat. ord. *Orchidaceae*; tribe *Vandeeae*. East Tropical Africa. Epiphyte, 6 inches high; leaves linear-oblong; inflorescence terminal, 3-6 inches long; flower yellowish-green, labellum rose-coloured superior.—*G. H.*

Potato Breeding, Some Essential Points in. By E. M. East, Ph.D. (*U.S.A. Exp. Stn. Conn., Bien. Rep.* 1907-8: pp. 429-447).—The author considers that the dropping of buds before they open, the falling of flowers immediately upon opening, the failure to produce viable pollen although the flowers open, and the power to produce viable pollen under all normal conditions are hereditary qualities. He finds that the fluctuations in these directions are large and are influenced by changing environmental conditions, but no ordinary treatment will force one of the above-named types across its critical point into another type. The removal of tubers to encourage flowering did not effect this. It seems likely that most natural fruits are formed after self-fertilization, and artificial self-fertilization was followed by greater fruitfulness than cross-fertilization. The normal healthy pollen is round, while the infertile pollen is shrivelled and irregular. Some of the pollen grains show up to seven or eight protuberances from the grains, and the author considers this to indicate the multinucleate character of these grains, and that the greater the number of such grains the greater the number of fruits produced by their aid. It is advised to pollinate a number of flowers on each cyme, as this acts as a stimulus to growth and lessens the danger of the berry falling before it ripens.—*F. J. C.*

Potato Diseases and Insect Pests. By T. W. Kirk, F.L.S. (*N.Z. Dep. Agr., Div. Biol. and Hort., Bull.* No. 7, 1907; 12 plates and

woodcuts).—This report includes observations on the *Phytophthora* blight and remedial measures employed, with reference to the special value of Bordeaux mixture; potato-leaf curl or *Macrosporium solani*, M. and E.; potato bacteriosis; potato scab (*Oospora scabies*); dry rot (*Fusarium oxysporum*); and the sclerotium disease, with the treatment employed in each instance.—*M. C. C.*

Potato Diseases: Early Blight in Wisconsin. By J. G. Milward (*U.S.A. Exp. Stn. Wisconsin, 24th Ann. Rep. 1907*, p. 343; figs.).—It is stated that the late blight due to *Phytophthora infestans* is practically unknown in the State; but that early potato blight due to *Alternaria solani* is an important factor in determining the potato crop. The disease is somewhat similar to late blight in its effects, but attacks the plants at an earlier stage. Experiments in spraying with Bordeaux mixture against the attacks of this pest have proved highly successful, as in previous years, particularly when the treatment has been coupled with good cultivation.—*F. J. C.*

Potato-spraying. By L. R. Jones and N. J. Geddings (*U.S.A. Exp. Stn. Vermont, Ann. Rep. 1906-7*; pp. 384-342). The use of Bordeaux mixture was followed by gains varying from 26 per cent. to 215 per cent., the greatest gain, as a rule, following the most frequent applications. The early blight (*Alternaria solani*) did considerable mischief; the late blight (*Phytophthora infestans*) did not appear. Comparative trials were made with some proprietary mixtures in comparison with Bordeaux arsenical mixture greatly in favour of the latter.—*F. J. C.*

Potatoes in Ohio. By W. J. Green and C. W. Waid (*U.S.A. Exp. Stn. Ohio, Bull. 174*; April 1906; figs.).—A list of potatoes grown at the experiment station with descriptions and yields. It is shown that some varieties are to a certain extent disease-resistant (not disease-proof). Spraying with Bordeaux mixture against the potato disease caused by *Phytophthora infestans* resulted in a gain in the crop of from 8 per cent. to over 70 per cent.—*F. J. C.*

Preservation of Piling against Marine Wood-borers. By C. Stowell Smith (*U.S.A. Dep. Agr., Forest Service, Circ. 128*).—To those who have to do with various timbers in connection with wharves and other marine structures a careful perusal of this excellent little work will be of both interest and value. Marine wood-borers do a great amount of damage to piles and buildings, with the result that the lasting properties of such are considerably shortened. The methods here recommended, though simple, would appear, from statistics that have been compiled, to have been most efficient.—*A. D. W.*

Preservative Treatment of Arbor-vitae Poles, The seasoning and. By C. Stowell Smith (*U.S.A. Dept. Agr., Forest Service, Circ. 136*).—An account of the treatment of arbor-vitae timber, which, on account of its strength, lightness, form, and durability, is the most desirable for telephone and telegraph work of any species found within the United

States. The chapters on "Preservative Treatment" methods of creosoting and shrinkage are all deeply interesting, and particularly so to British timber-merchants who adopt almost similar ways of prolonging the life of many of our native timbers. Skidding and weighing telegraph poles is well depicted in the illustration at page 6; while the many carefully compiled tables show how thoroughly the United States Department of Agriculture go into the matter of seasoning and preserving timbers.—

A. D. W.

Preservative Treatment of Hemlock and Tamarack Cross-Ties, The seasoning and. By W. F. Sherfese (U.S.A. Dept. Agr., Forest Service, Circ. 132).—Throughout the United States quite a revolution has taken place in the kinds of timber used for railway ties. Not so long ago oak was mainly used for this important purpose, and when oak became scarce Michigan arbor-vitae or Michigan cedar was resorted to as a substitute. Like oak, however, arbor-vitae has had enormous demands on its restricted supply; hence the railways were, for a third time, called upon to find some other more plentiful wood, with the result that to-day hemlock and tamarack are now almost exclusively employed. Many interesting notes regarding these two woods, such as the source of materials, seasoning, and storing away, are recorded in the pamphlet under notice, while the tables and illustrations go far in assisting the text.—A. D. W.

Prickly Pear as a Farm Crop. By David Griffiths (U.S.A. Dep. Agr., Bur. Plant. Ind., Bull. 124).—An account of experiments in cultivating the prickly pear, a plant useful for cattle after the spines have been singed off, a process apparently not difficult. The prickly pear is a valuable crop in districts such as Southern Texas, where the climatic conditions suit it, and are at the same time liable to be disastrous to other green crops.—M. L. H.

Pyrus sinensis. By O. Stapf (Bot. Mag. tab. 8226).—Nat. ord. Rosaceae; tribe Pomeae. Manchuria and Korea. Tree 30-40 feet high, cultivated; leaves ovate, 2-4 inches long; flowers 4-9-flowered; corymbs white; fruit (wild) globose, with numerous lenticels, 7 inches diameter.—G. H.

Raphionacme utilis. By N. E. Brown (Bot. Mag. tab. 8221).—Nat. ord. Asclepiadaceae; tribe Periploceae. Angola. Perennial herb with a turnip-shaped tuber 2-5 inches diameter; leaves in 2-5 pairs; blade $1\frac{1}{4}$ - $3\frac{1}{2}$ inches long; flowers in small terminal cymes; corolla $\frac{1}{2}$ inch diameter, bright purple.—G. H.

Rhodazalea Crouxii (Journ. Soc. Nat. Hort. Fr.; June 1908, p. 229).—This plant was produced by Messrs. Croux of Val d'Aulnay, and is a cross between *Rhododendron ochroleucum* and *Azalea mollis*. It is said to be an interesting and attractive shrub.—M. L. H.

Rhododendron, Branch Cankers of. By Hermann von Schrenk (Rep. Miss. Bot. Gard. 1907, pp. 77-80; 2 plates).—A description of cankers on *Rhododendron maximum* in the Appalachian Mountains formed round dead branches without either fungal or insect attack.

G. S. B.

Rhododendron kamtschaticum. By J. Hutchinson (*Bot. Mag.* ab. 8210).—Nat. ord. *Ericaceae*; tribe *Rhodoreae*. N.E. Asia and N.W. America. Under-shrub 6 inches high; leaves annual, $1\frac{1}{4}$ – $2\frac{1}{2}$ inches long; corolla carmine-purple.—*G. H.*

Rhododendron Madden var. obtusifolia. By J. Hutchinson (*Bot. Mag.* tab. 8212).—Nat. ord. *Ericaceae*; tribe *Rhodoreae*. Assam. Shrub 8–10 feet high; leaves $1\frac{1}{2}$ – $2\frac{3}{4}$ inches long; corolla white, $3\frac{1}{2}$ inches diameter.—*G. H.*

Robinia Kelseyi. By J. Hutchinson (*Bot. Mag.* tab. 8213).—Nat. ord. *Leguminosae*; tribe *Galegeae*. North America. Shrub 8–10 feet high; leaves pinnate; racemes, 5–8-flowered, $3\frac{1}{2}$ inches long; corolla rose-coloured.—*G. H.*

Rosa sericea var. pteracantha. By J. Hutchinson (*Bot. Mag.* tab. 8218).—Nat. ord. *Rosaceae*; tribe *Roseae*. Western China and Manipur. Shrub 10 feet in diameter; prickles large, red, compressed, decurrent and elongated at the base, $\frac{3}{4}$ – $1\frac{1}{2}$ inch long; leaves pinnate with 9–18 leaflets; flowers white.—*G. H.*

Salts, Soluble, Influence of, on Leaf Structure. By L. L. Harter (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 184; August 1908).—An experiment was undertaken to ascertain whether the presence of a mixture of soluble salts, chiefly common salt, will affect the structure of plants not specially adapted to live in “alkali” soils. Wheat, oats, and barley were used for the experiment. The seeds were germinated and grown for about four weeks in the soils in which the salts were mixed. The total soluble salts contained in the soils amounted to 1, 1.5, and 2 per cent. (0.7, 1.0, and 1.4 per cent. common salt). The seedlings showed a development of waxy bloom and a thickening of the cuticle. The thickening of the cuticle increased with the concentration of the soil solution, and at the same time the size of the epidermal cells decreased. When the amount of salt present is much below the minimum concentration that is injurious under field conditions, no perceptible modification occurred. Detached leaves with bloom upon them lost less water than normal leaves, and wheat plants grown in soils containing naturally 0.09 and 0.12 per cent. total salts (0.06 and 0.08 per cent. common salt) show an increased transpiration as compared with plants grown in a non-saline soil. The soil containing the smaller amount of salt induced the heavier transpiration.—*F. J. C.*

San José Scale. By J. Troop and C. G. Woodbury (*U.S.A. Exp. Stn. Purdue Univ., Bull.* 118; March 1907; 12 figs.).—An account of this pest against which lime sulphur wash is recommended. Proprietary washes were not found so effective. A spray calendar is given.—*F. J. C.*

Scale Insects in Old Apple Orchards, Control of (*U.S.A. Exp. Stn. New York, Bull.* 296; 1908).—Experiments with sprays commonly used for San José scale are described with details of cost. Orchards of badly infested standard apples of considerable age were treated. The plant

used for preparing and applying the washes consisted of an 8 h.p. boiler, three boiling tanks, and two gasoline power-spraying outfits costing altogether £118 10s., and being capable of turning out 2,500 gallons a day. In one experiment the trees were first heavily pruned, the tops being cut out and then three different lots were treated with crude petroleum, lime-sulphur wash, and lime-kerosene wash. The petroleum wash cost 2s. 8d. each tree, the lime-sulphur wash 1s. 1½d., the kerosene-lime 2s. 6d. The petroleum wash gave the best results with the scale, but the season's fruit crop was lost. With lime-sulphur the mortality of the scale was not so great, but no injury was done to the trees. The kerosene-lime wash caused severe injury to some of the trees, but did little harm to the scale. The following year the whole orchard was sprayed with the lime-sulphur wash at a cost of 1s. 10d. each tree. Considerable improvement was noted, although the scale was still present.—*C. H. H.*

Shelter-planting. By L. E. Barrett (*N.Z. Dept. Agri., Div. Live Stock & Agr., Bull.* 1).—This has special reference to the acacia and eucalyptus, both of which have been found peculiarly suitable for sheltering the orchard and farm in the Auckland provincial districts. As in this country, shelter belts of trees have been found of great value throughout New Zealand, especially when farming operations require to be carried out in cold and exposed districts. The raising of seedlings, and the future management of the trees, is interesting reading, and should prove of great value to those who intend going in for the embellishment of their farms and homesteads.—*A. D. W.*

Sodium Salts: Effect of Addition to deficient amounts of Potassium on Growth of Plants. By B. L. Hartwell, H. J. Wheeler, and F. R. Pember (*U.S.A. Exp. Stn. Rhode I., Rep.*, 1907, pp. 299-357; figs.).—An account of a very extended series of cultivations in sand and water containing deficient and approximately optimum amounts of potassium, and the same with the addition of sodium and of extra calcium. It was found that sodium produced no increase of growth when an optimum amount of potassium was present, but when potassium was deficient sodium gave an increase of growth; extra calcium did not, on the whole, increase the growth. It is considered that the increase in growth was not in any way due to an increase in the osmotic pressure of the solution, because the addition of extra calcium, magnesium, phosphorus, and nitrogen all failed to cause an increase in growth. A larger amount of potassium was left by the plants in the solution when the potassium in the original nutrient solution was supplemented by sodium; so that it would appear that sodium is a conserver of potassium. Similar results were obtained in experiments with plants in sand which had been digested with acid.—*F. J. C.*

Soil Fertility, Certain Organic Constituents of Soils in Relation to. By O. Schreiner and H. S. Reed (*U.S.A. Dep. Agr., Bur. of Soils, Bull.* 47; November 1907).—The authors consider that one of the chief causes of loss of fertility is due to the accumulation of certain organic compounds which are toxic to plants in the soil. This

bulletin shows that many of the substances ordinarily added to the soil as fertilizers have, in addition to their function as plant nutrients, "a well-defined power to overcome and actually destroy toxic bodies." Equal or greater improvement results from treatments that add nothing to the soil in the nature of plant nutrients. The methods of work are described, wheat being used for the experiments, and the following compounds were experimented upon:—(1) Compounds arising from the decomposition of proteid bodies; aspartic acid ($C_4H_7NO_4$), asparagin ($C_4H_4N_2O_3$), glycocoll ($C_2H_5NO_2$), alanine ($C_3H_7NO_2$), tyrosin ($C_9H_{11}NO_3$), and leucine ($C_6H_{13}NO_2$). Of these aspartic acid and tyrosin acted in the most detrimental manner upon the plants. (2) Arising from decomposition of lecithins: choline ($C_5H_{15}NO_2$), neurine ($C_5H_{13}NO$), were both found to be toxic. (8) Other nitrogenous compounds: alloxan ($C_4H_2N_2O_4$), guanine ($C_5H_5N_5O$), xanthine ($C_5H_4N_4O_2$), guanidine (CH_5N_3), skatol (C_9H_9N), pyridine (C_5H_5N), picoline ($C_5H_4N.CH_3$), piperidine ($C_5H_{11}N$), quinoline (C_9H_7N), ricin, mucin, all except guanine and xanthine, caused injury. (4) Non-nitrogenous compounds: pyrocatechin ($C_6H_4(OH)_2$), arbutin ($C_{12}H_{16}O_7$), pyrogallol ($C_6H_3(OH)_3$), phloroglucin ($C_6H_3(OH)_3$), vanillin ($C_8H_8O_3$), vanillic acid ($C_8H_8O_4$), quinic acid ($C_6H_7(OH)_4.COOH$), quinone ($C_6H_4O_2$), cumarin ($C_9H_6O_2$), daphnetin ($C_9H_6O_4$), esculin ($C_{15}H_{16}O_9$), heliotropine ($C_8H_6O_3$), borneol ($C_{10}H_{18}O$), camphor ($C_{10}H_{16}O$), turpentine oil ($C_{10}H_{16}$), were all more or less toxic.

Numerous interesting experiments are detailed showing how the toxic conditions set up by these substances may be removed or ameliorated; boiling, the absorption of them by such a substance as carbon black, the adding of a non-nutrient compound to the solution such as pyrogallol, the addition of various fertilizing materials such as nitrate of soda, were all tried with a greater or less degree of success.—F. J. C.

Soil Fertility, Some Factors influencing. By Dr. O. Schreiner and H. S. Reed (*U.S.A. Dep. Agr., Bur. of Soils, Bull.* 40, June 1907; 3 plates).—The authors consider that it has been demonstrated that many soils are unproductive, not because proper nutrients are lacking, but because they contain substances actually deleterious to plant growth. A considerable body of facts is cited in support of this conclusion. These deleterious matters may be absorbed by various substances which may be easily added to the soil, such as iron hydrate, carbon black, and so on. In soil extracts of unproductive soils great development of plants has followed the addition of such substances as two parts of pyrogallol per million of extract, or ten parts of alpha naphthylamine per million of extract. These two substances are without nutritive effect upon plants and can only act by ridding the soil of the toxic substance. In some soil extracts the toxic substance has been shown to be capable of passing over with the distillate when the extract is boiled. It is shown that the roots of plants excrete substances which, in the case of wheat, are more deleterious to the wheat-roots than are the excreta from other plants; while the excreta from oats are more harmful to wheat than those from more distantly related plants, as *Vigna* and maize. Those plants which succeed best in a rotation of crops with wheat produce

excreta which are least harmful to wheat. Evidence is accumulating that the excreta of certain plants may also be injurious to others very distantly related in certain cases.—*F. J. C.*

Soil tests in Wire Baskets. By B. L. Hartwell and F. R. Pember (*U.S.A. Exp. Stn. Rhode I., Bull.* 131; August 1908).—This bulletin is a continuation of Bulletin 120, and reports the results of comparative soil tests in paraffined wire baskets and in the field. The results obtained in the baskets frequently failed to coincide with those obtained in the field and duplicate tests were, furthermore, often not concordant. It is also concluded that the weight of the green crop is a better measure of the manurial effect of such a salt as muriate of potash than a measurement of transpiration such as has been adopted by the U.S.A. Department of Agriculture in many of their experiments.—*P. J. C.*

Stock on Seion, Influence of. By M. Viviani-Morel (*Jour. Soc. Nat. Hort. Fr.* October 1908, p. 572).—The influence of the stock is considered in the light of experience with regard to shape and quality of the fruit, and it is concluded that such influence is probably the same and acts in the same way as that of a different soil or source of nourishment. The difficulty of the subject is much increased by the fact that the parent stock itself does not possess an absolutely fixed and invariable type of fruit.

M. L. H.

Stocks for Fruit Trees in Australia (*Dep. Agr. Vict.* August 1908).—With apples the 'Northern Spy' and 'Winter Majetin' are used, especially the former. Crabstocks cannot be used, on account of the damage done by woolly aphids. A blight-proof Paradise stock has been raised. For plums the 'Julien,' 'La France' (a variety of the 'Myrobalan') and the 'Mussel' stocks are used. For cherries the 'Mazard' and 'Mahaleb' stocks are of little use. The latter does not behave as a dwarfing stock. A stock derived from the 'Montmorency' class of cherries is widely used.

Seedling pears are most commonly used as pear stocks. A good dwarf stock is the 'Angers' variety of quince.—*C. H. H.*

Sugar-cane Root Disease. By F. A. Stockdale, B.A., F.L.S., (*Jour. Imp. Dep. Agr. W.I.* vol. ix. No. 2, 1908, p. 103).—This disease in the West Indies is attributed chiefly to *Marasmius sacchari*, but other fungi may be the cause of some of the damage noted; several planters have adopted remedial measures with success. Further experiments are in hand, particularly as to the use of lime as a fungicide and the disinfection of cane cuttings.—*M. C. C.*

Sugar Industry.—West Indian Conference, 1908 (*Jour. Imp. Dep. Agr. W.I.* vol. ix. No. 2, 1908).—Further papers and communications published in detail:—

"Further Notes on Cane Farming at Trinidad," by Professor P. Carmody, F.C.S., &c.

"The Polarimetric Determination of Sucrose," parts iv. to vii., by H. A. Tempany, B.Sc., F.C.S., with discussions thereon.—*M. C. C.*

Sugar Industry. West Indian Conference, 1908 (*Journ. Imp. Dep. Agr. W. I.* vol. ix. No. 1, 1908).—The following papers read at the Conference are reported, with the discussions thereon:—

"Varieties of Sugar-cane and Manurial Experiments in British Guiana," by Prof. J. B. Harrison, C.M.G., &c.

"Sugar-cane Experiments in Barbados," by Prof. J. F. D'Albuquerque, M.A.

"Sugar-cane Experiments in the Leeward Islands," by Dr. Francis Watts, C.M.G., &c.

"The Central Sugar Factory at Antigua," by Dr. Francis Watts.

"Observations on the Work of Sugar-cane Mills, &c.," by Dr. Francis Watts.—*M. C. C.*

Temperature, Influence of, on Distribution of Insects. By E. D. Sanderson (*Jour. Econ. Entom.* I. 4 ; pp. 245-262).—The author has compared the distribution of various insects with the distribution of lines of average annual minimum temperatures in the States and finds that the average annual minimum temperature determines the northern limit of the distribution of the insect. The absolute minimum temperature which occurs at infrequent intervals fails to kill many of the insects which have succeeded in finding a sheltered situation, but where the average minimum drops below the point which they can withstand it has a powerful effect on checking their progress. The northern limit of distribution of the San José scale is said to be the isotherm of average minimum temperature, -15° F., and of the asparagus beetle (*Crioceris asparagi*), -10° F.—*F. J. C.*

Tobacco Wilt, The Granville. By Edwin F. Smith (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* No. 141 ; Part ii. ; August 1908).—This disease is due to bacteria. The plants are commonly infected through injuries caused by eel-worms. Potatoes, tomatoes, and other members of the night-shade family are also subject to this disease.

Remove and burn diseased plants. Remedial measures should look to reducing the number of eel-worms in the soil, and to greater care in transplanting so that the roots shall not be wounded.—*M. C. C.*

Tomato Notes (*U.S.A. Exp. Stn. West Virginia, Bull.* 117).—Contains notes on the history of the tomato, on breeding new forms, field culture and forcing, and the financial aspect of the industry.

M. L. H.

Variation of Shape in Fruits. By Pierre Passy (*La Pomologie Française*, Sept. 1908, pp. 275-283).—The terminal fruit of the pear, being the termination of the floral axis, extends out beyond the others in the bunch, its stem is less woody than the others, the fruit does not fall spontaneously, and is the most true to the characteristic shape of the variety. Variation in shape of fruit is illustrated by a photograph showing 'Doyenné du Comice' pears almost as round as apples, with hardly any stem.—*C. H. H.*

Vegetables, Profitable (*Die Gartenw.* lviii., p. 691 ; Nov. 7, 1908). Near Paris the "*Mays sucre*" is maize extensively grown for the market;

it is a most delicious vegetable, for use when the seeds are nearly but not quite ripe. Another plant now much grown is *Physalis edulis*, the fruits of which resemble the tomato but are much smaller. They are eagerly bought by hotels and the "gourmands." *Physalis Alkekengi* and *P. Franchetti* have similar fruit, and are rather smaller though edible as in *P. edulis*.—*G. R.*

Virescence of *Oxalis stricta*. By H. Hus (*Rep. Miss. Bot. Gard.* 1907, pp. 99; 2 plates).—In a form termed *O. stricta viridiflora*, found wild near St. Louis, the green petals are little affected by light and persist till the fruit is nearly ripe. The form is self-fertile.—*G. S. B.*

Weeds, Treatment of. By G. E. Stone and H. F. Fernald (*U.S.A. Exp. Stn. Massachusetts, Bull.* 123; April 1908).—Plants like chickweed (*Stellaria media*), moneywort (*Lysimachia Nummularia*), and other running weeds can be largely eradicated from lawns by treatment with nitrate of soda, which should be used strong enough to kill the weeds. This may also kill the grass, but a good growth of grass will come in again to the exclusion of the weeds. Dandelions on lawns may be sprayed with iron sulphate at the rate of 1½ lb. to 2 lb. to 1 gallon of water. Golden hawkweed on hay land is lessened or destroyed by the application of 3,000 lb. of salt per acre. For wild mustard (*Brassica* sp.), smartweed (*Polygonum* sp.), pigweed (*Amaranthus* sp.), cocklebur (*Xanthium canadense*), and ragweed (*Ambrosia* sp.), in oat fields and grass land, spray with sulphate of iron at the rate of 100 lb. to 52 gallons of water. The sulphate of iron application is said to cost 10d. to 1s. per acre, 52 gallons being sufficient for 1 acre. Lime and wood ashes are valuable for eradicating sorrel, mosses, ferns, &c. which grow in acid soil.

Arsenate of soda—2 lb. to 10 gallons of water—is a successful weed killer; but being poisonous, care should be taken in handling, nor should it be used too freely near valuable trees. It can be used to kill ivy on trees or buildings, by two or three waterings, and to kill tree stumps, holes being bored with an augur, arsenate of soda put in and the holes plugged up with corks. Spring is probably the best season for this treatment, which effectually prevents sprouting, and often obviates the necessity of digging out the stumps.—*C. H. H.*

Willow Growing in Lancashire. By W. Dallimore (*Kew Bull.*, 9; 1908).—Willows are grown at Mawdesley, S. Lancs., for basket making, fancy work, &c., on ground similar to that on which ordinary farm crops are grown, instead of the usual wet or marshy land, and to this the special toughness of the rods produced is attributed. An account of the method of cultivation adopted and a list of the varieties found most suitable for local conditions is given. Some 500 acres are under this crop on one farm in addition to other land in the neighbourhood.—*F. J. C.*

Wood Distillation. By W. C. Geer (*U.S.A. Dep. Agr., Forest Service, Circ.* 114).—This is an important circular which has been compiled to meet the demand for information regarding the commercial distillation

of hard woods and soft woods, and the quantity of the products obtained. Different woods give different marketable products, birch, beech, and maple yielding acetate of lime, wood, alcohol, and charcoal, while the long-leaf pine gives turpentine, tar, pine-oils, and charcoal. The various methods of procuring these by-products are clearly described, while the tables of results as to the various quantities procurable are interesting. The financial returns from by-products of the forest are considerable.

A. D. W.

Wood-lot Owners in the Ohio Valley Region, Suggestions to.

By S. I. Record (*U.S.A. Dep. Agr., Forest Service, Circ. 188*).—An excellent pamphlet on the protection of woods, value of different species, and the improvement of typical wood-lots. Its chief use, however, will be in assisting the farmers and others in the Ohio Valley in the proper management of their timber lands, conclusions which have been arrived at by the Forest Service after numerous careful examinations of the wood-lots and forest tracts being embodied in the publication. The notes under the heading of the Model Wood-lot might be read with much advantage by many cultivators of trees in this country, the information regarding how thickly the trees should stand on the ground, and how thinning should be engaged in, being written by one who knew well what he was speaking about.—A. D. W.

Wood Preservation, A primer of. By W. F. Sherfese (U.S.A. Dep. Agr., Forest Service, Circ. 189).—With greatly increased prices of timber forest conservancy becomes imperative, and there are two ways in which the situation may be met—one to prolong the life of the forest by wise use, and the other to prolong the life of timber by the use of preservatives.

This pamphlet treats of the latter, and is a valuable compilation of the various methods by which the end in view may best be accomplished.

The remarks under "What Wood Preservation can Do in the Future" are certainly well worthy of study.—A. D. W.

Woolly Aphis and Corrosive Sublimate (Le Kermes coquille).

By L. Chasset (*La Pomologie Française*, March 1908).—Painting with bichloride of mercury used at 2 per cent. seems to be the best means of getting rid of this insect.—C. H. H.

Yew-galls. By Miss Jenny Reynvaan and Dr. W. Docter's van Leeuwen (*Beih. Bot. Centralbl.* xxiii. 2te Abth. Heft 1, pp. 1-14; 2 plates).—This paper describes the bud-galls of the yew, which are caused by a mite (*Eriophyes psilaspis*). These mites live in the galls during winter, when the galls are 2 to 3 mm. in diameter. They lay their eggs in March, and increase greatly in numbers during the spring. The galls also enlarge and become 6-9 mm. long. The mites begin to leave their parent gall about the middle of May, and continue to do so for a long time. They wander over the twigs and infect the young buds about the middle of June. Several mites seem necessary to produce a gall. Even in July eggs may be found in the young galls, and by November there may be hundreds of mites in each of them. Both male and female trees are attacked.

The effects of the mites upon the tissues are carefully described. The cells of the dermatogen of the bud are much enlarged and swollen and the protoplasm is altered. The periblem is also altered, for it becomes several layers thick instead of only one layer as in normal buds.

G. F. S.-E.

Yucca, Additions to the Genus. By W. Trelease (*Rep. Miss. Bot. Gard.* 1907, pp. 225-280; 6 plates).—Descriptions of two new species: *Y. decipiens*, from the central tableland of Mexico, near *Y. australis*; and *Y. Endlicheriana*, the "pistilla" of Marte, Coahnila, Mexico, &c., near *Y. baccata*. The former species was figured by the author as *Y. valida* in the Thirteenth Report of the Garden (1902); the latter, which yields a valuable fibre, is figured in this memoir, together with *Y. periculosa*, which is the *Y. baccata periculosa* of Mr. Baker, and a new spontaneous variety, *Y. Harrimaniae Gilbertiana*, from Western Utah.—G. S. B.

Zaluzianskya maritima. By S. A. Skan (*Bot. Mag.* tab. 8215).—Nat ord. *Scrophulariaceae*; tribe, *Manuleae*. South Africa. Perennial herb; stem $\frac{1}{2}$ -3 feet high; leaves 1-3 inches long; spikes rather dense, with green bracts; flowers 1 inch diam.; corolla deep red below, white above.—G. H.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 14, 1908.

Mr. FRANCIS G. NOVERRE, F.R.H.S., in the Chair.

Fellows elected (39).—Mrs. C. Arbuthnot, Mrs. F. J. Baker, A. R. Barker, C. J. Barlow, Mrs. H. Beech, Col. Blagrove, Mrs. Blagrove, Lady F. Bourke, James Box, Mrs. Callander, F. S. Carter, Mrs. Child, Miss E. S. Collier, Mrs. Cookson, Mrs. H. Dickmann, A. Erith, Mrs. A. B. Fife, Viscount Gough, Mrs. Hamilton Gordon, Mrs. Greenwell, Mrs. A. Jervoise, Miss M. Joseph, E. D. Linton, C. H. W. Mander, G. E. B. Pritchett, E. S. Reid, W. Richardson, Lady G. Rolle, Miss A. Sandell, Miss C. A. Shirving, Mrs. J. Silverston, H. A. Soames, Mrs. Stuart-Moore, W. Thompson, J. Walton, Mrs. Watts, E. B. White, H. Wigley, Mrs. F. W. Zurhorst.

Societies affiliated (3).—Dulwich Chrysanthemum and Horticultural Society, Highcliffe Gardeners' Association, and Manchester Horticultural Improvement Society.

A lecture on "The more prominent Exhibits at the Royal Horticultural Society's Shows in 1907," illustrated by lantern slides, was given by Mr. J. Gregory.

GENERAL MEETING.

JANUARY 28, 1908.

Mr. ARTHUR W. SUTTON, F.L.S., V.M.H., in the Chair.

Fellows elected (46).—W. F. Adams, Mrs. C. Arkwright, R. Bayley, Denis Best, F. Bobby, Miss R. Browne, W. Cahill, Mrs. Campbell, Silas Cole, Mrs. R. Dangar, J. E. Dixon, W. S. Edwardson, Mrs. Ireby Fisher, Miss A. D. Fox, Lieut.-Col. R. Gardiner, H. E. Gaulter, Mrs. A. Hampson, Rev. C. A. Heurtley, R. Holsworth, W. Hutchinson, Mrs. C. Johnston, P. F. C. Jourdain, F. Kneller, Mrs. A. Lafone, Mrs. F. Lidderdale, Col. the Hon. O. Lumley, W. W. McKay, D. MacLean, Miss E. G. Miller, Miss M. A. Miller, Mrs. R. Nares, Mrs. Noble, C. W. Paxton, H. Phillips, B. C. Renshaw, Mrs. L. D. Ryder, Mrs.

W. Seton, Mrs. B. Simonds, P. Simpson, F.L.S., Miss A. H. Singleton, C. Smith, Lady Spielmann, Mrs. H. F. Stallard, W. P. Stephens, Mrs. R. H. Thornton, Mrs. M. L. Tweedie.

Fellows resident abroad (8).—W. J. D. Ansell (Cyprus), J. A. Chabaud (South Africa), the Ven. Archdeacon W. Clarke Hose (New South Wales).

Associate (1).—T. Hay.

Societies affiliated (4).—Bassaleg Horticultural Society, Charlton Kings Horticultural Society, Holmes and District Gardening Society, and Newport Pagnell and District Horticultural Society.

A lecture was given by Mr. T. Ernest Waltham, illustrated by lantern slides of Swiss alpine and other plants, on "Photography in Natural Colours." (See p. 40.)

ANNUAL GENERAL MEETING.

FEBRUARY 11, 1908.

Mr. J. GURNEY FOWLER, J.P. (Treasurer of the Society), in the Chair.

Fellows elected (80).—The Marquess of Ailesbury, Mrs. Aldrich, Mrs. J. H. Allan, Miss Anstruther-Thomson, C. G. Arbuthnot, Miss K. E. L. Arch, Mrs. Bailey, H. F. Bennie, F. Cavendish Bentinck, Mrs. John Biddulph, J. Bowerman, J. H. R. Bright, Mrs. T. B. Browne, Earl Cairns, Countess Cairns, Countess of Carnarvon, Mrs. Trevor Castle, Mrs. W. Cochrane, Miss Croft, Mrs. Daniels, Mrs. Dean-Pitt, E. M. de Luz, A. Dickson, C. T. Donaldson, A. A. Donnithorne, A. Drury, Mrs. G. Elin, A. C. L. Ellis, G. S. Evans, Mrs. Farquhar, Miss M. Fisher, J. R. FitzGerald, T. Fleming, Miss M. D. Fort, J. T. Foster, H. W. Gell, M.D., Hon. Mrs. H. Gibbs, R. N. Goodman, H. Stanley Goodyear, Miss G. E. Griffith, H. B. Grylls, Mrs. W. Hamilton, Mrs. A. Hannay, Mrs. H. Harrison, Miss A. Johnson, R. S. Keep, Sir A. W. Legard, Mrs. Leschallas, Mrs. H. W. Little, Mrs. W. MacGeagh, Miss McWatters, Mrs. Mounsey, Miss M. E. Napier, Miss Norman, Lady A. Paget, Lady Palmer, T. H. Parker, Mrs. Pearson, Miss A. Percival, E. J. Quainton, Mrs. A. H. Schlesinger, Lady Schuster, A. J. Stamp, R. W. Staniland, Mrs. Stanley-Adams, Mrs. Arnold Steer, Mrs. H. R. Thomas, W. F. Thomas, Mrs. W. Thompson, Mrs. Thynne, J. H. Tritton, Mrs. Ubsdell, A. A. Walters, G. W. Whyman, Mrs. Edw. Wilson, Lady Rivers Wilson, Mrs. Wood, A. Woollard, Mrs. Frank Young, Mrs. George Young.

Associates (12).—Miss C. M. Bell, Miss R. Brandberg, Miss D. Champion, Miss C. Crocknell, Miss S. Hymans de Tiel, Miss Fellowes, F. Fitch, Miss A. D. Grove, Miss G. Palmer, Miss K. E. T. Parsons, Miss L. Stevenson, Miss A. Tengstedt.

Societies affiliated (4).—Budleigh Salterton and District Horticultural Society, Burnley and District Horticultural Society, Newport Gardeners' Mutual Improvement Association, St. Peter's (St. Albans) Horticultural Society.

The Chairman moved the adoption of the Report, which was seconded by Sir John T. D. Llewelyn, Bart., V.M.H., and carried unanimously.

The following names of President, Vice-Presidents, members of Council and officers having been duly proposed and seconded, and the list circulated in accordance with Bye-law 74, and no alternative names having been proposed, were declared by the Chairman to be duly elected, viz. :

As new Members of Council.—The Hon. John Boscawen, Mr. E. A. Bowles, M.A., F.L.S., F.E.S., Mr. J. Gurney Fowler, Mr. W. Marshall, V.M.H.

As Vice-Presidents.—The Right Hon. Joseph Chamberlain, M.P., the Right Hon. the Earl of Ducie, the Right Hon. Lord Rothschild, Leopold de Rothschild, Esq., Sir John T. Dillwyn-Llewelyn, Bart., V.M.H., and Baron Sir Henry Schröder, Bart., V.M.H.

As Officers.—Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (President), J. Gurney Fowler, Esq. (Treasurer), Rev. W. Wilks, M.A. (Secretary), A. C. Harper, Esq. (Auditor).

Mr. Pearson moved a vote of thanks to the Chairman, which was seconded and carried unanimously.

REPORT OF THE COUNCIL

FOR THE YEAR 1907.

1. The One Hundred and Fourth Year.—Quiet, steady progress has again marked the past year.

2. Research Station and Laboratory at Wisley.—The most important feature of the year's work, and one which, it is hoped, will be productive of far-reaching results, is the completion of the Laboratory and Scientific Research Station at Wisley. The Opening Ceremony was kindly performed by the Right Hon. Lord Avebury, P.C., F.R.S., on July 19, when several Representatives of Government Departments, prominent men of Science and Horticulture, and members of the Surrey County Council were present. The occasion was one of great gratification, for it brought the realisation of a long-cherished but long-deferred desire for a Scientific Station under the direct control of the Society for research into the problems affecting plant life and plant disease at present confronting and baffling the gardener. Several very interesting speeches were delivered on the occasion. These are reported in the JOURNAL (vol. xxxiii. p. 329).

Among the first subjects to be investigated are soil-sterilisation by steam as a means of destroying those pests of plants which live in the soil; the influence of sterilisation on the plants subsequently cultivated in the soil; the bacteria of the soil; etherisation of plants; and certain definite plant diseases. Each of these subjects will entail a large amount of laboratory work, as well as of experiment in the Garden.

Mr. Frederick J. Chittenden, F.L.S., from the Chelmsford Laboratories of the Essex County Council, and for some years Secretary of our Society's Scientific Committee, has been appointed Director, having under his care both the Research work and the Students' Laboratory, the latter at present

accommodating twenty-four young men. The Students' training has thus been extended and improved, with a definite syllabus, and a time-table apportioning their work between the Gardens for practical work and the Laboratory for Scientific Study. The curriculum has received the approval of the Board of Agriculture, of the Science and Art Department, South Kensington, and of the Surrey County Council, who have asked the Society to co-operate with their efforts to afford horticultural education in the County, they themselves offering a certain number of Scholarships in the Society's Gardens to lads from the Elementary and Secondary Schools of the County. The Laboratory is recognised by the Board of Education as a Technical School for Grant, in conformity with whose Regulations Messrs. W. A. Bilney, J.P., E. A. Bowles, M.A., W. Marshall, V.M.H., Harry J. Veitch, V.M.H., and the Rev. W. Wilks, M.A., have been appointed Managers.

The question of the association of the Society in its Educational and Research work at Wisley with the University of London has, at the request of the Council, been brought before the Authorities of the University by Sir Albert Rollit, who is a member both of the Council of our Society and also of the Senate of the University, and, at the suggestion of the latter, the consideration of the subject has been adjourned for the moment, pending the appointment by the University of a Professor of Biology.

3. Donations, Prizes, and Scholarships.—The Council acknowledge with heartiest thanks the receipt of the £100 offered by Mr. Arthur W. Sutton, J.P., V.M.H., to inaugurate a Prize Scheme for the Students at the Gardens; and also the gift of an excellent photographic outfit for use at Wisley from Mrs. Hornby Lewis.

With reference to the Prize Scheme, which has not yet been definitely formulated, it is hoped that further donations will be forthcoming sufficient to secure an annual income of £15 to £20, so that the books or apparatus given as prizes may be worth working for, and serve as a real stimulus to the young men. The Council would also welcome the foundation of Scholarships.

Whilst on the subject of Donations, it should be mentioned that the Royal Dutch Bulb Growers' Society at Haarlem have kindly placed at the disposal of the Council a series of Prizes, ranging from £2 2s. to £8 8s., for forced Hyacinths, to be competed for at the Society's Exhibition on March 31, 1908. There are to be six classes, three for Amateurs and Gentlemen's Gardeners and three for Nurserymen. Full particulars will be found in the Book of Arrangements for 1908.

4. Wisley Gardens.—The new Garden, which was so generously purchased for the Society's use by Sir Thomas Hanbury, V.M.H., K.C.V.O., is gradually being brought into thorough working order. Much, however, still remains to be done. Various trials of flowers and vegetables have been carried out, and Mr. George Massee, V.M.H., has conducted some original research work.

Contributions of Orchids have been presented to the Gardens by Sir Trevor Lawrence, Bart., V.M.H., K.C.V.O., Sir Jeremiah Colman, Bart., Lieut.-Colonel Holford, C.I.E., C.V.O., W. A. Bilney, Esq., J.P., P. Balli,

Esq., F. Wellesley, Esq., J.P., J. S. Moss, Esq., C. A. White, Esq., J. Sparkes, Esq., Messrs. J. Veitch, Messrs. Charlesworth, Messrs. J. W. Moore, and Messrs. George Bunyard. It is hoped that these will form the nucleus of a far larger collection in a few years to come.

The number of visitors to the Gardens admitted by Fellows' Tickets during the year 1907 amounted to 8,818, as compared with 8,147 in 1906. This is exclusive of Horticultural parties, which were admitted by special arrangement, and would increase the total to over 10,000. The number would, no doubt, have been even larger but for the very unsettled weather of the summer of 1907.

The work in connection with the office of Superintendent has so greatly increased that it has been found necessary to appoint an Assistant Superintendent, and Mr. Arthur C. Smith has been selected for the post.

5. Wisley Land Tax.—The Council were advised to redeem the Land Tax on the Wisley Gardens in anticipation of a greatly increased assessment of the property. This therefore was done at a cost of £42 5s.

6. The Union of Horticultural Mutual Improvement Societies.—The Union of Mutual Improvement Societies is another development of the past year. The Council hope, by thus drawing the many isolated, but exceedingly useful, Horticultural Mutual Improvement Societies into federation with our Society, and with each other, to strengthen and encourage them, and generally to promote their welfare. It is intended under this scheme to gather from existing Societies the most suitable rules and regulations and general constitution for the information of newly starting Societies, to keep a List of Lecturers willing to assist them, and to furnish them with printed lectures, when a lecturer cannot be secured, or unavoidably fails to fulfil his engagement. All Affiliated Societies are included in the Union.

7. The Report of the Genetics Conference.—The Report of the International Conference on Genetics, held in the summer of 1906 and edited by our Secretary, was published in the spring, and presented to all who were present at or took any part in the Conference, and to all Fellows who had made application for it. The Council have received many congratulations upon the excellence of this Report, which forms the most complete collection of information on this interesting subject yet published.

8. Obituaries.—The death-roll among prominent Fellows of the Society is, unhappily, unusually heavy. First to be mentioned must be Sir Thomas Hanbury, K.C.V.O., the generous donor of the Wisley Garden. Then follow Sir Frederick Wigan, Bart., who for several years was a Vice-President of the Society, and one of our most prominent growers of Orchids; and Dr. Masters, F.R.S., Vice-Chairman of the Scientific Committee for many years, and always a prominent figure at all the Society's Meetings and Conferences. The Society has lost another constant friend in Sir Michael Foster, F.R.S., whose Horticultural work, especially amongst Irises, is well known to all. Mention must also be made of the Right Hon. Lord Battersea, Sir Alexander Arbuthnot, K.C.S.I., C.I.E., Major Bythway, Mr. Frederick Q. Lane, Mr. R. I.

Measures, the Hon. Mark Rolle, Lady Louisa Egerton, Mr. John Assbee, and Mr. James Herbert Veitch.

9. Masters' Memorial Fund.—The Council wish to commend the "Masters' Memorial Fund" to the support of the Fellows of the Society. In the latter part of the year a meeting was held to consider in what way the late Dr. Masters' memory, and his work for Scientific Horticulture, could be most suitably perpetuated, and it was at once felt by all that the most fitting memorial would be to establish Foundation Lectures on the application of Science to Horticulture, to be called "The Masters' Memorial Lectures," similar to existing Foundation Lectures in Law, Medicine, and other sciences. The Council gladly accepted the suggestion, and a circular letter was sent out to the Fellows, in response to which about £320 has thus far been received. It is greatly hoped that further donations may yet be made to the fund in order that three lectures at least may be adequately endowed, and so carry on Dr. Masters' memory to succeeding generations of gardeners.

10. Retiring Members of the Council.—Under Bye-law 60 the Hon. John Boscawen, Mr. J. Gurney Fowler, and Mr. William Marshall, V.M.H., the three members of the Council who have been longest in office, retire, but are proposed for re-election. The Earl of Tankerville, finding that distance from London prevents his regular attendance at the meetings of the Council, has asked to be allowed to resign, and the Council hope that Mr. E. A. Bowles, M.A., of Myddelton House, Waltham Cross, Vice-Chairman of the Scientific Committee, may be elected to fill the vacancy thus caused.

11. Victoria Medal of Honour.—During the past year three vacancies in the roll of the Victoria Medal of Honour have occurred (Sir Thomas Hanbury, Sir Michael Foster, and Mr. Harry Turner), and Sir John Dillwyn Llewelyn, Bart., Mr. Henry Ballantine (the veteran head gardener to Baron Schröder), and Mr. George Dickson, the rosarian, of Newtonards, Ireland, have been elected by the Council.

12. Annual Progress.—The following table will show the Society's progress in regard to numerical strength during the past year:—

LOSS BY DEATH IN 1907.				FELLOWS ELECTED IN 1907.			
		£	s. d.			£	s. d.
Life Fellows . . .	23 .	0	0 0	Hon. Members . . .	4 .	0	0 0
4 Guineas . . .	4 .	16	16 0	4 Guineas . . .	4 .	16	16 0
2 " . . .	61 .	128	2 0	2 " . . .	510 .	1,071	0 0
1 " . . .	68 .	71	8 0	1 " . . .	600 .	680	0 0
	156	£216	6 0	Associates . . .	34 .	17	17 0
				Affiliated Societies .	87 .	88	17 0
				Commutations . . .	20 .		
				= £443 3s. 0d.			
LOSS BY RESIGNATION, &c.							
		£	s. d.			£	s. d.
4 Guineas . . .	2 .	8	8 0		1,209	£1,774	10 0
2 " . . .	105 .	220	10 0	Deduct Loss . . .		870	9 0
1 " . . .	383 .	402	8 0	NET INCREASE IN INCOME		£904	1 0
Associates . . .	16 .	8	8 0				
Affiliated Societies .	14 .	14	14 0	New Fellows, &c. . .		1,209	
	520	£654	8 0	Resignations and Deaths .		676	
				NUMERICAL INCREASE . .		588	
				Total on December 31, 1906 .		9,467	
TOTAL LOSS	676	£870	9 0	Total on December 31, 1907 .		10,000	

The Council are pleased to record that the total number of Fellows, Honorary or Corresponding Members, Associates, and Affiliated Societies is now 10,000, which is believed to be the highest number belonging to any British Royal Society.

13. Journal.—Volume XXXII. of the Journal, which deals with the work and lectures of the Society during the whole of 1906, was sent out in June last, and a further issue, Volume XXXIII., containing the records of January to June 1907, is about to be issued.

14. Examinations.—The Society again held its three examinations: one in General Horticultural Knowledge; one, for School Teachers, in Cottage and Allotment Gardening; and one for men employed in Public Parks and Gardens. These will be continued in 1908 with an addition to the "School Teachers' Examination" of Elementary Chemistry and Biology, which subjects will be optional in 1908, but obligatory in future years. A fourth examination is also to be established—viz., for juniors under nineteen years of age, in Elementary Gardening.

15. Letting of the Hall.—The results of the Hall Lettings have been increasingly satisfactory. In certain months the demand for engagements is even greater than can be accommodated. One of the most notable of the tenancies of 1907 was the South African Products Exhibition, opened by His Majesty the King on February 23. Highly satisfactory testimonies to the commercial value of the Hall have appeared in the press, and the Council sincerely thank those Fellows, Lessees, and others who have done so much to draw attention to its excellence for Shows, Concerts, Meetings, and all general purposes.

The dates booked for 1908 are already in excess of 1907; in fact comparatively few dates still remain open.

16. Shows in 1907.—During the year twenty-nine Exhibitions, covering thirty-five days, have been held by the Society.

17. The Temple Show.—By the renewed kindness of the Treasurer and Benchers the Society held its great Show for the twentieth year in succession on May 28, 29, and 30, in the gardens of the Inner Temple. The attendance was again a record one.

In 1908 a similar Show has been arranged for May 26, 27, and 28, when there will be a Private View open to Fellows' Tickets only, on Wednesday, May 27, between the hours of 7 A.M. and noon. Fellows are particularly requested to notice that there will be no admission by payment to this Private View; it will be reserved only for the Annual Tickets, Transferable and Non-transferable alike. This arrangement has been made to meet the wishes of many Fellows, and to obviate as far as possible the unpleasantness of overcrowding.

18. The Summer Show.—On July 9 and 10 the Society's Annual Summer Show was held in the Park of Holland House by the kind permission of Mary, Countess of Ilchester, who has most generously consented to the Summer Show of 1908 being again held there.

Dr.

ANNUAL REVENUE AND EXPENDITURE

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Ground Rent	690	0	0			
Rates and Taxes	604	10	0			
Water Rate	66	14	0			
Electric Lighting	264	3	1			
Gas	25	8	9			
Insurances	48	5	0			
				1,699	0	10
Salaries and Wages	1,565	13	4			
Printing and Stationery	720	1	7			
Postages	363	11	11			
Fuel	53	14	0			
Architect and Auditor's Fees	105	18	7			
Gratuities	40	15	0			
Repairs and Renewals	288	8	4			
Miscellaneous Expenses	281	4	5			
				3,419	7	2
„ JOURNAL, PRINTING AND POSTAGE				3,485	8	4
„ PAINTING ORCHID PICTURES... ..				43	10	0
„ LINDLEY LIBRARY				16	11	6
„ SHOWS and MEETINGS—						
Temple Show	718	17	11			
Holland Park Show	627	8	0			
Special Autumn Show	265	13	11			
Labour	127	1	1			
Expenses of Floral Meetings and Conferences	192	9	2			
				1,931	10	1
„ PRIZES and MEDALS—						
Committee Awards				468	16	3
„ WISLEY GARDENS—						
Rates, Taxes, and Insurances	124	19	7			
Superintendent's Salary	225	0	0			
Labour	884	17	10			
Trees and Shrubs	17	4	6			
Garden Implements	78	19	11			
Loam and Manure	80	12	9			
Repairs	31	17	9			
Fuel	233	4	0			
Miscellaneous Expenses	244	2	7			
				1,920	18	11
„ COST of GROWING, PACKING, and DISTRIBUTION of PLANTS to FELLOWS						
				276	19	1
„ LABORATORY, WISLEY—						
Director's Salary	150	0	0			
Opening Ceremony	77	7	9			
Miscellaneous Expenses	51	4	10			
				278	12	7
„ DEPRECIATION—						
Hall Glass Roof, Furniture, Glass Houses, Wisley, and Plant and Materials				496	7	8
„ BALANCE, carried to Balance Sheet				6,477	12	8
				<u>£20,514</u>	<u>15</u>	<u>1</u>

ACCOUNT for YEAR ending DECEMBER 31, 1907.

Cr.

					£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS	...	...	...					13,266	18	0
„ ENTRANCE FEES	...	...	...	...				388	10	0
„ DIVIDENDS AND INTEREST	...	...	...					868	13	0
„ SHOWS AND MEETINGS—										
Temple Show	...	...	...	...	1,780	11	4			
Holland Park Show	...	...	...	...	605	4	1			
Special Autumn Show	...	...	...	...	25	0	0			
Takings at Hall Shows	...	...	...	...	249	8	0			
					—	—	—	2,660	3	5
„ JOURNALS AND OTHER PUBLICATIONS—										
Advertisements	...	...	...	...	697	19	1			
Sale of Journals	...	...	...	...	188	6	7			
					—	—	—	886	5	8
HALL LETTINGS	...	...	...	...	2,252	3	6			
<i>Less</i> Labour Expenses	...	...	...	...	200	12	8			
					—	—	—	2,051	10	10
„ PRIZES AND MEDALS	...	...	...	...				134	6	4
„ EXAMINATIONS IN HORTICULTURE—										
Amount received in Fees	...	...	...	...	90	10	0			
<i>Less</i> expended	...	...	...	...	61	12	0			
					—	—	—	28	18	0
„ WISLEY GARDENS—										
Produce sold	...	...	...	...	20	12	11			
Students' Fees	...	...	...	...	52	10	0			
Inspection of Gardens	...	...	...	...	156	6	11			
					—	—	—	229	9	10

Dr.

BALANCE SHEET,

				£	s.	d.	£	s.	d.	
To CAPITAL FUND ACCOUNTS—										
As at December 31, 1906	...	...	...	34,210	0	10			
Received since, New Hall				£	s.	d.				
Building Fund	2	2	0							
„ Donations, Laboratory	108	0	0							
„ Life Compositions	443	3	0							
Williams' Memorial Fund	168	0	0							
							721	5	0	
							34,931	5	10	
„ SUNDRY CREDITORS	...	...	...				1,402	2	0
„ SUBSCRIPTIONS, &c., paid in advance	...	...					635	10	6
„ WISLEY SCHOLARSHIP—										
As at December 31, 1906...	...	18	15	0						
Amount received since	...	25	0	0						
							43	15	0	
Less expended	...	...	...				25	0	0
								18	15	0
„ LAWRENCE TESTIMONIAL FUND	...	...					389	0	5
„ DEPRECIATION AND RENEWALS RESERVE										
ACCOUNT	...	...	...	...	...		979	5	3
„ GENERAL REVENUE ACCOUNT—										
Balance, December 31, 1906	...	...	...	35,252	5	5			
Less Bad Debts	...	...	...	23	12	2			
							35,228	13	3	
„ REVENUE FOR THE YEAR, as per annexed										
Account	..	...	...	...	...	6,477	12	8	
								41,706	5	11

£80,062 4 11

DECEMBER 31, 1907.

Cr.

	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
„ NEW HALL AND OFFICES—						
As at December 31, 1906	40,144	0	8			
Expenditure since (Revolving Door, &c.)	232	14	9			
				40,376	15	5
„ FURNISHING THE HALL AND OFFICES—						
As at December 31, 1906	2,031	0	0			
Expenditure since	57	5	6			
				2,088	5	6
„ DWELLING HOUSES, WISLEY—						
As at December 31, 1906	2,236	19	4			
Expenditure since	153	6	3			
				2,390	5	7
„ GLASS HOUSES AND RANGES, WISLEY				3,295	15	2
„ LABORATORY, WISLEY—						
As at December 31, 1906	275	0	0			
Expenditure since	1,152	14	1			
				1,427	14	1
				49,578	15	9
„ PLANT AND MATERIALS—						
Appliances for Shows	236	11	0			
Fittings, Wisley	58	8	6			
Horse and Cart, Wisley	37	0	0			
Fencing and Wire Netting, Wisley	36	15	0			
Scientific Instruments and Fittings, Laboratory	170	4	5			
Breakable Apparatus, Laboratory	85	9	8			
				624	8	7
„ SUNDRY DEBTORS...				587	12	4
„ INVESTMENTS—						
2½ % Consols, £10,576 3s. 11d.	9,960	4	9			
(£2,022 8s. 9d. of this sum is held by the Society, subject to the provisions of the will of the late J. Davis, Esq.)						
£7 Annuity East Indian Railway, Class B, Williams' Memorial Fund	168	0	0			
3 % Local Loan, £5,800	6,006	16	6			
Indian Rupee Paper, 37,000 Rupees	2,462	14	4			
4 % Canadian Inscribed Stock £2,000	2,077	11	0			
2½ % National War Loan, £3,108 12s. 11d.	3,045	0	0			
4 % Canadian Pacific Rly. Co. Consolidated Debenture Stock, £4,632	4,999	14	1			
				28,720	0	8
<i>The approximate value of these Investments is £26,318.</i>						
„ CASH—						
At Bank	526	5	9			
In Hand	25	1	10			
				551	7	7
				£80,062	4	11

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on December 31, 1907.

ALFRED C. HARPER, F.C.A., Auditor (HARPER BROTHERS),
Chartered Accountant, 10 Trinity Square, E.C.

January 17, 1908.

19. Colonial Fruit Shows.—The two Colonial Fruit Shows held in June and November were most satisfactory, and the Council have from time to time received many expressions of thanks and of the debt of gratitude which the Colonies owe to the Society for them. They have also received many assurances of the encouraging stimulus these Shows and the Society's Awards have given to fruit growers in the Colonies. This year the number and size of the exhibits have increased, and the Judges, at the November Show in particular, pronounced the fruit to be the best hitherto imported to England for excellence in quality, colour, and packing. Similar Shows are to be held on March 5 and 6, June 11 and 12, and November 26 and 27 in the coming year. The Council hope that the Fellows will take a more active interest in these exhibitions, as they are organised at considerable trouble, and, as a matter of experience, visitors never fail to be interested and pleased with the immense variety of fruits illustrative of the resources of Britain-over-the-Seas.

20. Burnham Beeches.—At the request of the Right Hon. the Lord Mayor and the Corporation of the City of London, the Council, on August 20, appointed a small committee, consisting of Mr. F. J. Chittenden, Mr. Harry J. Veitch, V.M.H., Mr. A. D. Webster, and the Rev. W. Wilks, M.A., to examine and report upon the condition of the trees at Burnham Beeches. The Committee devoted considerable attention to the matter, and towards the end of September issued their report to the Corporation. (See JOURNAL, vol. xxxiii. p. 557.) A letter of thanks has since been received from the Right Hon. Sir James Bell, the Lord Mayor.

21. Deputations.—The Council have with much pleasure received and accepted invitations to send deputations to the Cornwall Spring Flower Society on April 7, 1908; to the Jubilee Meeting of the Yorkshire Floral Society on June 16, 1908; and to the Durham, Northumberland, and Newcastle-upon-Tyne Society's Show on July 1, 1908.

22. Kindred Society Shows.—Many Fellows having expressed their disappointment at being excluded (except on payment) from the Flower Shows held in the Hall by Special Societies, the Council have this year made it a stipulation that all Special-flower Societies taking advantage, as such, of the specially reduced terms for the use of the Hall shall admit all our Society's Fellows' Tickets free.

The following regulations have been issued, and Fellows will see from the announcement on their tickets which Special Societies have accepted the very liberal terms thus offered by the Society.

(1) If a kindred Society can, by arrangement, fix their Show on a Wednesday or a Thursday following one of the R.H.S. Fortnightly Shows, then the Kindred Society shall have the gate money and the use of the Hall free of all charge, attendants being provided by the kindred Society, and free admission given to all holders of R.H.S. Tickets.

(2) A kindred Society unable to adopt such Wednesday or Thursday shall have the use of the Hall for £5 for the day, 6 A.M. to 6 P.M., the gate money being taken by the kindred Society, who must provide all

attendants; the tables will be set up by the R.H.S., and all R.H.S. Tickets must be admitted free.

(8) A kindred Society unable to admit R.H.S. Tickets must negotiate for the use of the Hall on the ordinary scale of charges for letting.

28. Reduced Railway Fares.—At the request of a large number of Fellows, the Council prepared a Petition to the Railway Companies of Great Britain, asking for similar privileges of reduced railway fares to those granted to some other Societies. The Petition was signed by nearly 8,000 Fellows, and met with a courteous but decided refusal. (See vol. xxxiii. p. 565.)

24. Sir Joseph Hooker, F.R.S., K.C.M.G., &c., &c.—In June the Council had the pleasure of sending to Sir Joseph Hooker the hearty congratulations of the Society on the attainment of his ninetieth birthday, to which Sir Joseph made a most interesting reply, which will be found in the account of the opening of the Wisley Laboratory in the Society's JOURNAL, vol. xxxiii. p. 897.

25. Committees, &c.—The hearty thanks of the Society are again due to the Members of the Committees, the Judges, the Lecturers, the Writers of Papers communicated to the JOURNAL, the Compilers of Abstracts, and last, but by no means least, to the several Examiners, and to others who, by their self-denying work in the Society's service, have largely contributed to the success of the past twelve months, and to the high position held by the Royal Horticultural Society among the practical and scientific Societies of the world.

By Order of the Council,

W. WILKS, *Secretary*.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

December 31, 1907.

GENERAL MEETING.

MARCH 3, 1908.

Mr. HARRY J. VEITCH, F.L.S., V.M.H., in the Chair.

Fellows elected (101).—T. Alexander, Lady Alington, Major-Gen. J. H. Allen, R. Archer, Miss H. Banner, Miss E. Barlow, Miss F. Bean, Miss M. Beeton, Lady Bingham, Lady Blake, Mrs. C. Bone, Miss Bradshaw, C. J. Bromhead, Mrs. Bromley, Mrs. Buchanan, W. D. Buncombe, Miss C. M. Burnaby-Dyott, Miss S. Caldecott, Miss O. Charlton, Miss J. B. Charters, C. du P. Chiappini, E. H. Christy, C. P. Clayton, Miss Clifford, Miss Cory, A. J. Cowling, Mrs. E. Cree, Lady Cunningham, Mrs. G. Darrochy, W. M. Day, Baroness de Brienon, W. C. Dicks, Lady Dobson, O. Durant-Parker, Mrs. H. V. Ellis, Viscountess Encombe, Mrs. Erith, John F. Evans, W. Everett, H. R. Farmer, Mrs. E. Firth, Mrs. Fleming, A. E. Gibbs, I. Godber, Mrs. E. M. Grant-Dalton, R. Gurney, Goodwyn Hall, L. H. Halling, J. C. Hanbury, Lady Maud Hastings, Mrs. C. Healey,

H. W. Heath, Mrs. Vesey Holt, Mrs. Howell, M. E. Hughes-Hughes, Rev. R. Lee James, J. O. Jeffery, Miss M. Johnson, Miss A. E. Keep, Mrs. T. A. Kirk, C. F. E. Lear, Mrs. D. Little, J. MacDonald, A. Manning, Mrs. Marker, Mrs. Maunsell, Capt. J. A. Morrison, Hon. Mrs. Morrison, Mrs. C. Morrison-Bell, H. Nye, Mrs. E. Palmer, J. O. Peed, S. H. Peed, Capt. G. E. Price, Norris E. Prince, Mrs. R. Rayner, Miss E. Rickman, Miss Ridsdale, Rev. R. S. Roberts, G. E. W. Robinson, Mrs. W. C. Ryde, Mrs. G. Savill, Rev. C. Serjeant, Mrs. J. F. Shaw, Mrs. A. Simpson, W. Simpson, Mrs. G. Smith, A. T. Stephens, E. R. Still, Mrs. Strode, Miss C. J. Styles, J. H. M. Taylor, H. J. Thrustans, G. A. Tonge, H. L. Venning, H. Wainwright, Lady Wake, Mrs. Bernard S. Walker, J. M. Wallace, C. P. Whiteley, Hon. Mrs. Tom Wood.

Fellows resident abroad (2).—P. Howell Ridge (Guernsey), H. Luzuki, Jr. (Japan).

Associates (5).—D. B. Adair, Miss d'E. Image, Miss N. B. Harrison, Miss E. A. Jameson, Miss P. M. Rope.

Societies affiliated (5).—Aldeburgh Horticultural Society, Bowden Amateur Horticultural Club, North Vancouver Horticultural Society, Pitsford and District Horticultural Society, Redhill, Reigate, and District Gardeners' Mutual Improvement Association.

A lecture on "Bulbous Plants in New Zealand" was given by Mr. E. White, of New Zealand (see p. 1).

EXHIBITION OF COLONIAL-GROWN FRUIT AND VEGETABLES, BOTH FRESH AND PRESERVED.

MARCH 5 AND 6, 1908.

JUDGES.

Butt, Geo. F.
Fielder, C. R.
Garcia, M.

Hudson, Jas., V.M.H.
Walker, A. M.
Wilks, Rev. W., M.A.

Gold Medal.

Mr. C. Du P. Chiappini, Cape Town, for a collection of Fruit.

Mr. T. J. Poupart, of Covent Garden, for Grapes, Apples, Melons, &c.

The Army and Navy Auxiliary Stores, Francis Street, for a collection of various Colonial Fruits.

The Government of Nova Scotia, for a collection of Apples.

Silver-gilt Knightian Medal.

The Cape Orchard Co., Cape Colony, for Apples, Peaches, Plums, &c.

Messrs. B. Jackson, Piccadilly, W., for Cape Bottled Fruits and Preserves.

Messrs. E. Westmacott, Leadenhall Street, E.C., for Bottled Fruits and Wines.

Messrs. Brown & Maxem, Covent Garden, for Melons, Grapes, Apples, &c.

Silver-gilt Banksian Medal.

Sir Somerset French, K.C.M.G., Victoria Street, S.W., for Paintings of Cape Scenery.

The Rhodes Fruit Farms, Groot, Drakenstein, for Bottled Fruits and Preserves.

Silver Knightian Medal.

The Rhodes Fruit Farms, Groot, Drakenstein, for Pears and Plums.

A. Chiappini, Esq., The Retreat, Cape Town, for Grapes.

Messrs. Malan Bros., Constantia, for Pears.

The Hon. J. W. Sauer, Uitkyk, Paarl, for Grapes.

Mr. S. L. Simon, Durban, for collection of Grape Fruits.

Silver Banksian Medal.

B.W.N. Specialities, Tooley Street, S.E., for Jellies and Honey.

Messrs. Myers, New Broad Street, E.C., for Preserves.

G. S. Hauptfleisch, Esq., Huguenot, S. Paarl, for Grapes.

A. Nicholson, Esq., Stellenbosch, Cape Colony, for Grapes, Nectarines, Peaches, &c.

Bronze Banksian Medal.

O. C. M. Barry, Esq., Rustenburg, for Pears and Plums.

Messrs. Heynes, Mathew, Adderley Street, Cape Town, for Sauces.

REPORT ON EXHIBIT FROM CYPRUS.

A small exhibit of Oranges, Lemons, and Preserved Fruit was sent from Cyprus with a request for a report thereupon, as this was a purely tentative and preliminary consignment, the first ever sent from this colony.

Oval Oranges.—Varying considerably in size and appearance, some of the smaller specimens having a smooth skin, the larger ones exceedingly rugged and coarse, and of enormous size, weighing as much as 1 $\frac{3}{4}$ pound apiece! On opening them I expected to find a very thick pithy skin and flesh full of seeds; but this was by no means the case: the skin was not disproportionately pithy or thick, and (in the ones I opened) there were absolutely no seeds. Flavour very fair, but not quite of the highest.

Round Oranges.—More even in size than the "ovals," but still very large and slightly rugged in appearance. Very few seeds and of decidedly good flavour.

Bitter Oranges.—Exceedingly bitter, flesh very acid; full of seeds. Would make excellent marmalade owing to the exceeding bitterness and acidity.

Lemons.—Very fine indeed; large, full of juice and flavour. Few seeds; skin smooth and filled with oil. An excellent sample.

Preserved Fruits.

Bottles.—These were very inferior. Self-closing air-tight bottles should in all cases be used.

Apricots.—Apparently preserved in syrup, making them far too sweet; the flavour of the fruit, however, was good, but the medium in which

they were preserved might best be described as concentrated liquid sugar, so sweet was it and sticky. Much less sugar (probably only a third) should be used.

Orange Peel.—Preserved in syrup and exceedingly good, the bitterness of the peel and the sweetness of the syrup harmonising well.

Quince.—I am a little in doubt whether this was our English Quince, or the Loquat, which is often called Japanese Quince. In texture it was excellent, much softer than our English Quince usually is when preserved whole or in quarters, and the flavour a little less pronounced, which most people would consider a gain. The syrup had escaped from this bottle, so I had the lumps of fruit laid on basket lids in a very cool oven for two or three nights, and the result is a first-rate fruit sweetmeat, most palatable.

Nectarines.—The best as well as the most distinct and unusual of all the preserved fruits sent. The fruits, though in very sweet syrup, retained a delightful acidity together with the distinctive flavour of the fresh fruit. They appear to be called "White Apricots" locally.

Young Bitter Oranges.—Resembling those sent from the south of France, but decidedly better for those who like sweet things. These were almost crystallised or glacé, the syrup having almost solidified.

Cherries.—Very well made, but far far too sweet, so much so as to leave little flavour beside.

Apples.—No flavour at all. Quite useless for the English market.

Mosphila Jelly (Azeral Hawthorn).—Very well made and possessing a pleasant acidity, but only little flavour of fruit.

Crystallised Fruits, Mixed.—They were neither crystallised nor glacé, and had the appearance of fruits preserved in very thick syrup and then sprinkled over with coarse-grained sugar. To make them saleable they must be presented quite dry.

Speaking of the preserved fruits generally, the Nectarines (or White Apricots) and the Orange Peel were first rate, the Apricots, Quince, and young Bitter Oranges very good. All these, if they were sent in better bottles and could once get a fair trial on the London market, would, I believe, meet with a ready sale.

W. WILKS,
Sec. R.H.S.

Larnaca, Cyprus: 17 April, 1908.

Dear Sir,

I am very pleased with the success of the few exhibits sent to your show in March, and I beg to thank you for giving me the opportunity of showing Cyprus fruit. I have reported the matter to his Excellency the High Commissioner, who is very pleased. I hope to place Oranges and Lemons on the London market in December. Several firms have offered their services as agents. I also hope to send further exhibits to the R.H.S., as their work in this connection is very valuable to the Colonies.

Yours faithfully,
W. J. ANSELL.

GENERAL MEETING.

MARCH 17, 1908.

Mr. GEORGE PAUL, J.P., V.M.H., in the Chair.

Fellows elected (65).—F. Adnitt, J.P., A. H. Allen, H. Barton, E. J. Catt, J. Chantrey, A. Coates, E. A. Collins, C. H. Chapman, Col. de Villamil, H. S. Dunham, Miss Ebbutt, Lieut.-Col. Ellicombe, Mrs. A. Fleming, Mrs. A. Freeman, Sir Stephen Gatty, Mrs. Green-shields, Mrs. Kerr Gullard, Mrs. Gwynne-Holford, Mrs. Hallward, H. W. A. Harrison, W. H. Hatcher, J. A. Humphery, Mrs. Kingsbury Jameson, Mrs. W. Jameson, Miss E. M. Johnson, Mrs. Wm. Kenny, Carl Koettgen, Miss Laughton, H. P. Leach, W. B. Leaf, Mrs. J. Lindsay, H. S. Locksmith, Miss Lumsden, C. Martineau, Mrs. Finchett Maddock, J. A. Mayer, E. A. Miller, Mrs. Milsome, J. Murphy, H. P. Parrott, Dr. A. Gordon Paterson, Lieut. J. H. J. Phillips, A. W. Raikes, Dr. A. S. Ransome, Mrs. R. A. Read, Miss Rennie, Mrs. Rickett, A. B. Riley, Miss M. A. Ryder, Miss Scott, R. C. H. Sinclair, Miss O. K. E. Smith, A. L. Stephens, Col. W. H. Stuart, C. H. Tandevin, E. Tate, Mrs. Tatham, J. H. Templer, Mrs. F. Tetley, Mrs. Toomer, Mrs. Tower, F. Turner, Madame Vagliano, Mrs. Alfred Whitehead, A. Wynne Williams.

Fellow resident abroad (1).—J. Havelock-Cæsar (India).

Associates (2).—A. J. Jones, A. Marsh.

Society affiliated (1).—Holmer, Munstone, and District Cottage Garden Improvement Society.

A lecture on "Beautiful Flowering Trees and Shrubs," illustrated by lantern slides, was given by Mr. G. Gordon, V.M.H. (see p. 4).

GENERAL MEETING.

MARCH 31, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair.

Fellows elected (78).—Mrs. J. Anderson, Mrs. H. Bentinck, C. E. Birch, E. A. Bonnor-Maurice, M. C. Bonsor, Mrs. H. E. Buxton, Miss E. L. Campbell, H. F. Carlill, Miss S. Carlisle, Mrs. Hay Chapman, Dr. G. E. J. Crallan, V. J. Cummings, C. S. Daniels, Mrs. T. M. Dermer, W. de Winton, Miss Hay Drummond, C. Elliott, Miss Elliot, J. Francis, Mrs. J. Fraser, H. Foreich, Mrs. Fuchs, Lady Furness, H. C. Gardner, Mrs. J. Gidley, S. Greenfield, J. Gregory, Mrs. G. Grinnell-Milne, Mrs. R. H. J. Gurney, W. Holtham, A. A. Horley, H. C. Houndle, H. C. Humphery, Mrs. J. Murray Irwin, Miss Isaac, Mrs. Macdonald, Mrs. Malkin, J. Mansey, A. L. Matley, Mrs. Mitchell, Mrs. F. Murray, Mrs. W. H. Newman, Mrs. Northey, Mrs. R. Nugent, Lady Muriel Paget, W. Pascoe, Mrs. W. Lawson Peacock, G. Pearce, R. de Q. Quincey, Miss Reeves, H. J. Richard, Miss D. Richards, Mrs. Savill, Mrs. L. R. Schloss, Miss Scott, J. Scruby, G. W. von U. Searle, A. Shakelton, M. Sharpe, O. B. Shelswell, Mrs. L. Sillar, H. Spencer Smallman, J. T. Smurthwaite, Miss E. B. Tarry, W. Theobald, Miss C. K.

Tollemache, Ivor Vachell, Miss M. Warren, Mrs. A. Watts, J. D. Webb, Lady Wernher, Mrs. E. G. Wheler, Lady Sarah Wilson, C. Wilson, Miss S. M. Williams, Mrs. R. Wombwell, A. H. Wood, C. Young.

Fellow resident abroad (1).—W. Baylis (New Zealand).

Associate (1).—S. Goddard.

Societies affiliated (2).—Farnham Horticultural Society, Studland Horticultural Society.

A lecture on "The History of the Cabbage Tribe," illustrated by lantern slides, was given by the Rev. Professor G. Henslow, M.A., V.M.H. (see p. 15).

EXHIBITION OF FORCED HYACINTHS.

The Royal Dutch Bulb Growers' Society at Haarlem offered the under-mentioned prizes for forced Hyacinths. The conditions of the competition were that each bulb must be in a separate pot (size optional), and all must have been forced entirely in Great Britain or Ireland; no exhibit may contain more than two specimens of any one variety; and no exhibitor may exhibit in more than one class.

Division I.—For Amateurs and Gentlemen's Gardeners.

Class III. 18 Hyacinths. First Prize, £8 8s.; Second, £4 4s.

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|----|---|--|---|-------|
| 1. | { | Hon. Vicary Gibbs, Aldenham House, Elstree (gr. E. Beckett, V.M.H.) | } | equal |
| | | L. Novlett, Esq., 107 High Street, Wavertree, Liverpool (gr. K. T. Bushell). | | |

2. No award.

Class IV. 12 Hyacinths. First Prize, £6 6s.; Second, £3 3s.

1. Lord Howard de Walden, Audley End, Saffron Walden (gr. J. Vert).

2. Hon. Whitelaw Reid, Wrest Park, Ampthill, Beds (gr. G. Mackinley).

Class V. 6 Hyacinths. First Prize, £4 4s.; Second, £2 2s.

1. T. A. Bevan, Esq., Trent Park, New Barnet (gr. H. Parr).

2. H. J. Bartleet, Esq., Severndroog, Shooters Hill.

Division II.—For Nurserymen.

Class VI. 24 Hyacinths. First Prize, £8 8s.; Second, £4 4s.

1. Messrs. R. & J. Cuthbert, Southgate, N.

2. No award.

Class VII. 18 Hyacinths. First Prize, £6 6s.; Second, £3 3s.

No entry.

Class VIII. 12 Hyacinths. First Prize, £4 4s.; Second, £2 2s.

No entry.

DEPUTATION TO TRURO.

APRIL 7, 1908.

An invitation having been received to attend the Cornwall Daffodil and Spring Flower Show, the Council deputed Lieut.-Col. Holford, C.I.E., C.V.O., Messrs. Harry J. Veitch, V.M.H., W. A. Bilney, J.P., Henry B. May, and the Rev. W. Wilks, M.A., to represent them. The deputation travelled down to Cornwall on Monday, April 6, by the 10.30 A.M. express, which runs to Truro with only one stop—at Plymouth—and were hospitably received by the Cornish Committee. The deputation assembled at the Market Hall, Truro, at 10.30 A.M. on Tuesday, April 7, and made the following awards:—

Gold Medal.

To J. C. Williams, Esq., for Daffodils.

Silver-gilt Banksian Medal.

To R. Fox, Esq.,
To D. H. Shilson, Esq., } for Rhododendrons.
To R. Fox, Esq., for hardwooded flowering shrubs.

Silver Flora Medal.

To Dorrien Smith, Esq., for rare flowering plants.
To Messrs. R. Veitch,
To Mr. G. Reuthe, } each for a group of plants.
To Messrs. Cutbush,
To Percy Williams, Esq., for Daffodils.
To T. B. Bolitho, Esq.,
To Sir A. D. Vivian, Bart., } for hardwooded flowering shrubs.
To Percy Williams, Esq., for Polyanthus Primroses.

Silver Banksian Medal.

To Mary, Countess of Ilchester, for six hardwooded flowering shrubs.
To the Devon Rosary for Roses.
To Messrs. Barr, for Daffodils.
To Mrs. Rogers of Penrose, for Rhododendron 'Suave.'

At 1.30 the deputation were most hospitably entertained at luncheon by A. P. Nix, Esq., after which they were driven to "Tregothnan," at the kind invitation of Viscount and Viscountess Falmouth, and were shown through the gardens, and took tea with her Ladyship. On Wednesday the 8th the deputation went by motor car to Heligan, where Mr. Tremaine showed them his wonderful Sikkim rhododendrons and his beautiful wild garden with all its rare trees and shrubs, and most hospitably entertained them at luncheon, and forwarded them on to Caerhays Castle, where Mr. and Mrs. J. C. Williams accompanied them all through their wonderful collection of rhododendrons, tree ferns, bamboos, daffodils, primroses, &c., and entertained them to tea. The deputation left Truro on Thursday carrying with them the most lasting recollection of the kindness and generous hospitality of their Cornish gardening friends.

The Council directed letters of thanks to be sent in their name to Viscount and Viscountess Falmouth, A. P. Nix, Esq., J. Tremaine, Esq., and J. C. Williams, Esq., for their kindness, and also to the Hon. John and Lady Margaret Boscawen, by whom all the plans had been made and so successfully carried into effect.

GENERAL MEETING.

APRIL 14, 1908.

SIR ALBERT ROLLIT, Kt., J.P., in the Chair.

Fellows elected (64).—J. A. Abercromby, F.R.G.S., R. K. Allison, Miss R. M. Alston, Dr. F. W. Andrewes, A. N. Argenti, H. J. Barnell, Mrs. J. Field Beale, Miss A. Beresford-Hope, G. F. Berney, Capt. G. B. Bethell, R.N., J. P. Bishop, Mrs. A. Bott, G. C. Brightling, H. Hanslow Brind, Miss Buckley, G. Burch, Miss L. Carver, Mrs. G. Clowes, Mrs. Turner Collin, Sir Arthur Collins, Mrs. R. W. Doyne, Lady Duff, A. H. Fass, Rev. L. R. Flood, Mrs. J. Aylward Game, Miss E. Gregson, Mrs. Haigh, G. Hingston, Mrs. Hopwood, Mrs. Thomas Hughes, H. A. Inness, F. Jackson, H. Jolis, the Earl of Kerry, Capt. J. G. Le Marchant, Mrs. Arthur Leslie, Lady Lighton, Lady Macpherson-Grant, Mrs. W. Mivet, Miss Montgomery, Mrs. H. H. Nelson, Lady Paget, J. W. Peake, Miss Peele, Miss Preston, Mrs. W. E. B. Priestley, Mrs. C. E. Rennie, Lady Buchanan-Riddell, C. Bernard Robinson, Horace H. Scott, Mrs. J. H. Scott, Mrs. Sechiari, A. Allan Shand, Miss H. Sheldon, Dr. C. W. Suckling, Miss E. Tancred, F. T. Tremel, W. Waddington, T. Rawdon Ward, Miss Watney, Mrs. Wheeler, A. Wilkins, N. Wilkinson, Mrs. Yerburch-Bonsey.

Fellows resident abroad (4).—F. G. Browne (China), T. Godwin (New South Wales), James Henderson (South America), F. Searle (New South Wales).

Society affiliated (1).—Cardiff Gardeners' Association.

A lecture on "Hardy Cacti and other Succulents" was given by Mr. E. A. Bowles, M.A., F.L.S., F.E.S. (see p. 24).

GENERAL MEETING.

APRIL 28, 1908.

MR. HARRY J. VEITCH, F.L.S., V.M.H., in the Chair.

Fellows elected (44).—E. J. Addington, Miss A. Barnwell, G. Blaxland, H. B. Brandt, R. Bristowe, Admiral Sir James Bruce, Mrs. Pelham Bullock, D. Burns, J. St. Clair Campbell, Mrs. Henry Cock, Captain J. S. Cuthbert, D.S.O., C. J. Dale, E. G. Dolman, Miss D. C. Egerton, Lady Forbes, Lady Grey, W. Handysides, R. P. Hart-Dyke, Mrs. J. Haughton, Mrs. Humbert, E. Illott, Miss A. Ionides, Mrs. Joicey, A. King, N. W. Lewis, Mrs. W. A. Malcolm, A. Manckton, Col. J. A. Moggridge, G. Monro, C. E. Moody, Mrs. Peachey, Percival Rees, Mrs. A. Richards, S. B. Rowbotham, F. W. Salcombe, Mrs. C. H. Sargant, Mrs. W. Aldwin

Soames, C. V. Stewart, Lady Margaret Crichton Stuart, Mrs. W. J. Tait, Capt. A. H. Thurburn, Mrs. Wilson, D. Cory Wright, Lieut.-Col. H. A. Yorke.

Fellow resident abroad (1).—H. S. Sulbarao (India).

Associate (1).—J. Reynolds.

Societies affiliated (8).—Cottingham Gardeners' Society, Umtali Horticultural Society, Warwickshire Horticultural Association.

A lecture on "The Profession of Landscape Gardening" was given by Mr. Edward White, F.R.H.S. (see p. 82).

SCIENTIFIC COMMITTEE.

JANUARY 14, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and twelve members present.

Weevils on Greasebands.—Mr. Saunders, F.L.S., reported that the three weevils captured on the greasebands shown at the meeting held on December 31, 1907, belonged to a species of *Magdalinus*, but they were too much battered to make out the exact species. There appears to be no record of them attacking plants to a serious extent.

Malformed Flower of Dendrobium nobile.—Mr. Worsdell, F.L.S., reported that he had examined the very curious malformed flower of *Dendrobium nobile* sent from the R.H.S. Gardens. He found an attempt at the making of a dimerous flower, but the attempt was partially abortive. Two sepals only were developed, and two petals, one lateral, the other, half of the form and colour of the labellum, and half of the form and colour of an ordinary petal. The latter petal was inserted partly in the position usually occupied by the labellum, partly in the position normally occupied by one of the other petals. The ovary had aborted.

Ornithogalum lacteum.—Mr. Holmes, F.L.S., showed a flowering specimen of this plant sent from the Cape. The bulb had not been planted, nor, apparently, supplied with moisture.

Fasciated Holly.—Dr. Farmer showed a curiously fasciated and twisted specimen of the common holly. The stem was fully an inch in breadth and curled round at the apex. It was observed that the causes that bring about fasciation are obscure, and would form a promising subject for further investigation. Sometimes the peculiarity can be induced to appear in individual plants as the result of over-feeding, and it is not infrequently supposed to be directly traceable to this cause. But a little reflection will show that the stimulus given by rich nutriment only serves as the means of causing a tendency already present in the particular plant to materialize. The fact that only an individual here and there of a number of plants grown under similar conditions exhibits the character in question at once proves that the cause is deeply seated in the plant itself, and is not attributable solely to the effects of over-feeding. Whilst in lilies, *Tropaeolums*, thistles, &c., comparatively few individuals are thus affected, there are others, *e.g.*, *Celosia cristata*, some varieties of *Sedum*, &c., in which it occurs in a considerable proportion of the offspring of every generation. The investigations of De Vries seem to indicate that the tendency to fasciation may be regarded, from the point of view of heredity, as being analogous to that which causes some plants, *e.g.*, stocks, to throw out a certain percentage of double-flowering individuals in each generation. But in these potentially fasciated individuals the property of fasciation may lie dormant unless the stimulus of abundant nutrition calls it out. This proximate dependence on excessive feeding has led

many persons to overlook the much more important fact that the only real function of the food in the matter is to make the plant show what it already can do, and not to impress upon it a new character. It seems not unlikely that much of the improvement in our ordinary vegetables, consequent on intensive cultivation, may primarily be attributed to similar causes.

In the fasciated stem of the specimen shown the pith has undergone a considerable relative increase, and constitutes about three quarters of the cross-sectional area of the stem in the upper banded portion. It might have been expected that the flattened expansion would have assumed the histological character proper to the leaf, that is to say, the green chlorophyll-containing cells might have shown some modification in the direction of producing palisade parenchyma. Such is, however, not the case, and the cortex in every respect, save in its contour, resembles that of the normal young branch, and, like the latter, it forms a layer of cork from its peripheral cells.

Colour and Scent of Flowers.—Mr. Douglas, V.M.H., raised the question as to whether there was any relation between the colour and scent of flowers, remarking that there certainly seemed to be in the case of carnations. The subject would apparently repay investigation.

Inoculation of Leguminous Plants.—Mr. Chittenden produced a copy of the suggested plan for carrying out a trial of the effect of inoculating peas with cultures of nodule-forming bacteria at Wisley, and explained the manner in which it was intended to estimate the result.

SCIENTIFIC COMMITTEE, JANUARY 28, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, with sixteen members present and numerous visitors.

Inheritance of Pigment in Pisum sativum.—Mr. Hurst, F.L.S., communicated the following note from Mr. E. A. Bunyard, of Maidstone, on "The Inheritance of Pigment in *Pisum sativum*":—"The green and yellow colours of the cotyledons of *Pisum sativum* were selected by Mendel as one pair of constant differentiating characters, and from their apparent alternative inheritance the theory of gametic purity was deduced to explain results obtained in this species. The lack of any definite examination of the two colours in question led me to make some chemical and photo-chemical experiments as below, the pigments of the cotyledons alone being considered. The green pigment is, of course, chlorophyll, and thin sections mounted in glycerin show the chloroplasts well, and give the well-known 'hypochlorin reaction' when treated under the cover-glass with glacial acetic acid. An alcoholic extract also gives the well-known bands in the red when spectroscopically examined, and the fainter bands in the blue and violet. The yellow colour is due to a pigment of the xanthophyll series, pigments which are always found in association with chlorophyll in the green parts of plants. The point, however, which is of importance is the gradual fading of the green (Sachs's 'degradation of chlorophyll') and the presence of the xanthophyll. The green chloroplasts, as the seeds attain maturity, gradually lose their green pigment,

and when it has entirely vanished they are left in the cell as pale yellow globules. The yellow xanthophyll has, however, been present from the beginning, and the disappearance of the chlorophyll green has merely rendered it visible. The simultaneous presence of the two colouring matters can be demonstrated in this way. When a number of green cotyledons are steeped in alcohol a green extract, as referred to above, is obtained, and this fluid retains its green colour only so long as it is kept from light. When it is exposed to daylight, or even gaslight, it rapidly loses the green colour and fades to a yellowish tint. Upon examining this spectroscopically it is found to have absorption bands in the blue and violet identical with that of an alcoholic extract made from yellow cotyledons. This fading of the green is seen in the autumnal colouring of leaves, and in an inverse order the slow development of chlorophyll when etiolated plants are exposed to light. These facts, I venture to think, render it necessary to modify Mendel's original conception in this special case, as it is evident that the conception of a factor for green and one for yellow, and the alternative inheritance of each, is hardly in harmony with the facts. As all cotyledons pass through the green stage, and certain only pass through to the yellow, I would suggest that the factor may be not a factor of *quality*, but a factor which extends or limits development." Commenting upon the foregoing, Mr. Hurst wrote:—"The above note by Mr. Bunyard is a valuable contribution to our knowledge of the nature of Mendelian characters in peas. According to Mr. Bunyard's results, green peas contain invisible yellows at all stages of their development, while yellow peas contain green in the early stages only. A yellow pea may therefore be regarded as due to the presence of a factor which causes the green to fade at an early stage of development, while in the green pea this factor is absent. The Mendelian units concerned are therefore not simply yellow and green, as Mendel supposed—for all green peas contain the yellow element as well as the green—but would appear to be rather the presence and absence of a factor which causes the green to fade."

Hybrid Brassicas.—Mr. Sutton, V.M.H., read a paper, which he illustrated by means of lantern slides, upon "Hybrid Brassicas," giving details of a large number of interesting experiments which have led to important results, although no forms of commercial importance have been produced. It is particularly interesting to note that *Brassica Napus* (rape) would not cross with *B. oleracea* (the cabbage, thousand-headed kale, &c.), nor would *B. Rapa* (the turnip and swede); and of further interest is the fact that the kales 'Ragged Jack' and 'Asparagus' kale would not cross with the cabbage group, but crossed with *B. Napus*, thus indicating that they were nearly related to that species. In all the crosses made, where crossing could be accomplished, the seedlings proved to be, as a rule, somewhat like both parents, and were practically all alike. Reciprocal crosses, however, did not always give identical results, but a question put by Mr. Chittenden elicited the fact that the same individuals were not always used in making these reciprocal crosses, *i.e.*, the seed parent in the one case was not always the pollen parent in the other. In the second generation segregation occurred in every case where it was possible to obtain seedlings (many of the F 1 generation proved

sterile), and plants approaching in appearance the original types were produced. Thus when 'Ragged Jack' kale was crossed with swede in the first generation plants somewhat intermediate were produced; but when seed from these was sown, of the resulting 198 plants, 160 had bulbs, 98 had none, 142 had swede-like foliage, 88 had 'Ragged Jack'-like foliage, and 18 were intermediate. In some cases the figures obtained indicated that the characters segregated in the simple Mendelian proportions of 8 to 1, or 9 to 7, but it seemed evident that in other cases the matter was more complicated. In some of the crosses it is interesting to note that the hybrids developed a purple coloration, though in the foliage this was not to be seen in either of the parents. In the discussion that followed it was remarked that in no case, although the type of plant was regained in the second generation, did the progeny approach in excellence of development the original parents; and, as Mr. Odell remarked, it was singular that the only plants that promise anything of commercial value among all the crosses raised were the result of more or less promiscuous interbreeding (see p. 48).

SCIENTIFIC COMMITTEE, FEBRUARY 11, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and nineteen members present.

Red Currant Twigs twisted.—Mr. Güssow showed shoots of red currant twisted and curled at the tips, arising from the confinement of the young growths under nets.

Microloma lineare.—Mr. O'Brien, V.M.H., sent specimens of this uncommon Aselepiad, showing how it climbs over bushes in its native home in South Africa. The plant is very rare in cultivation.

Bigeneric Orchid Hybrid.—Sir Jeremiah Colman, Bart., showed a hybrid raised between *Diacrium bicornutum* and *Cattleya intermedia alba*. The colour of the *Diacrium* had been almost entirely lost except for a tinge of sulphur in the labellum. The parent species are usually regarded as being widely separated in natural relationship, but a hybrid between *D. bicornutum* and *Laelia cinnabarina* was awarded a botanical certificate on March 14, 1905.

Nomenclature of Hybrid Orchids, &c.—Some discussion took place with regard to the naming of hybrids between species assigned to two or more genera. The general opinion was that such hybrids should, when raised between plants belonging to two different genera, have the names of both genera indicated; but where the progeny was the result of crossing a bigeneric hybrid with a plant of another genus altogether, a purely conventional name should be assigned, preferably with a distinctive termination. The further discussion of the matter was adjourned to another meeting.

Diseased Sweet Williams.—Lady Hopkins, of Romsey, sent Sweet Williams in a dying condition, with pale brown spots upon their leaves, which were due to the attacks of the fungus *Puccinia Dianthi*. This fungus frequently proves fatal to the Sweet William, and the infection is said to be carried in the seed, so that whole batches are killed. The

particular variety in this case was 'Pink Beauty,' and the present is the second year in which the trouble has occurred, though in different spots in the same garden.

Insects on Oleander, &c.—Mr. Saunders, F.L.S., reported that he had examined the insects found upon various plants in a greenhouse, and sent by Mr. Stanton Brown, A.R.H.S. They belonged to the family *Psocidae*, and were specimens of the uncommon species *Caccilius Dali*. This species is not known as a plant pest, but is said to feed upon fungoid matter of various kinds, mould on palings and rust fungi on leaves, &c. They are most frequent upon the bark of trees.

SCIENTIFIC COMMITTEE, MARCH 3, 1908.

Sir JOHN T. DILLWYN-LLEWELYN, Bart., in the Chair, with seventeen members present and numerous visitors.

Inheritance of Albinism in Orchids.—The following communication was received from Mr. Hurst, F.L.S.:—Two distinct and definite cases of albino orchids producing coloured forms when crossed were recently brought before this Committee by Mr. Chapman. Such facts, accepted by the Mendelians, are important, inasmuch as they go to show that albinism in orchids is inherited in a similar manner to albinism in sweet peas and ten-week stocks, and in accordance with Mendel's law. An albino orchid is distinguished from a coloured one by the absence of purple sap. For instance, the well-known *Paphiopedilum* (*Cypripedium*) *insigne* *Sanderæ* is an albino form from which the purple sap of the type has disappeared. Recent experiments with sweet peas and stocks, carried out by Mr. Bateson, F.R.S., Mr. Punnett, and Miss Saunders at Cambridge have fully demonstrated that the appearance of sap colour depends on the simultaneous presence of two colour factors. If both of the colour factors are present the sap is coloured, but if either (or both) of the colour factors is absent the sap is colourless. With regard to the cases of *Paphiopedilum* (*Cypripedium*) brought forward by Mr. Chapman for the sake of simplicity we will call the two colour factors C and P. The typical coloured forms of *P. insigne*, *P. bellatulum*, *P. callosum*, and *P. Lawrenceanum* will therefore be carrying both of the colour factors C and P. Their albinos will, on the other hand, be carrying either the C factor alone or the P factor alone (or neither). The known facts of the breeding of albinos of these four species seem to be in accordance with the conception that *P. insigne* *Sanderæ* and *P. bellatulum* *album* are carrying the factor C alone; while *P. callosum* *Sanderæ* and *P. Lawrenceanum* *Hyeatum* are carrying the factor P alone (or *vice versa*), as the following table, comprising all the results known to me, shows:—

TABLE A.

1. *P. insigne* *Sanderæ* (C) × *P. insigne* *Sanderæ* (C) gives albinos (C C).
2. *P. callosum* *Sanderæ* (P) × *P. callosum* *Sanderæ* (P) gives albinos (P P).
3. *P. Lawrenceanum* *Hyeatum* (P) × *P. Lawrenceanum* *Hyeatum* (P) gives albinos (P P).
4. *P. Lawrenceanum* *Hyeatum* (P) × *P. callosum* *Sanderæ* (P) gives albinos (P P).

5. *P. callosum* Sanderae (P) × *P. insigne* Sanderae (C) gives coloured hybrids (C P).
6. *P. callosum* Sanderae (P) × *P. bellatulum album* (C) gives coloured hybrids (C P).
7. *P. bellatulum album* (C) × *P. Lawrenceanum* Hyeatum (P) gives coloured hybrids (C P).

The next table gives the remaining possible matings between the albinos concerned, together with the *expected* results :—

TABLE B.

1. *P. bellatulum album* (C) × *P. bellatulum album* (C) should give albinos (C C).
2. *P. bellatulum album* (C) × *P. insigne* Sanderae (C) should give albinos (C C).
3. *P. insigne* Sanderae (C) × *P. Lawrenceanum* Hyeatum (P) should give coloured hybrids (C P).

Future results will show how far the above conception, based on Mendel's law, is correct. If Mr. Chapman thinks well to self the coloured hybrids that he obtained from two albinos, he may expect to get, on the average, nine coloured forms to seven albinos (see pp. xxix and xxx).

Bigenetic Hybrid Orchid.—Mr. Rolfe, A.L.S., drew attention to the bigeneric orchid *Epi-diacrium Colmanii* shown by Sir Jeremiah Colman, Bart., and raised between *Diacrium bicornutum* ♀ and *Epidendrum ciliare* ♂, and remarked that this new and interesting hybrid approached closely in habit, inflorescence, and form of flower to the pollen parent. He also commented upon the question of the nomenclature of bi- and poly-generic hybrids, saying that he considered it best to compound the name of the hybrid from the names of the parent species, and to avoid conventional names unless they were so formed, as long as it is possible to do so.

Green-flowered Primula sinensis.—Mr. Sutton, V.M.H., showed a plant of Chinese primula with green flowers, the appearance being due apparently to chlorosis of the corolla. The seed had been sown in 1904 and onwards, and had each year bred true until this plant had appeared among the seedlings raised last year. Only once before had Mr. Sutton seen a similar thing, and that was in 1902, when the same kind of sport occurred in another stock of double white *P. sinensis*, but in that case the flowers were not so well developed. The pollen appears perfect, and possibly seeds may be obtained from the plant.

Colour Sports in Boronia and Erica.—Mr. Veitch, V.M.H., showed a plant of the albino form of *Boronia megastigma*, a portion of one branch of which bore flowers of the normal colour, purplish-brown, thus reverting to the type from which the sport arose. From Mr. Earp, of Bayham Abbey, came a spike of an *Erica* (sp.?) which last year had borne white flowers only, but every flower this year was of a pinkish colour. Some members of the Committee thought that possibly the flowers in the previous year had been caused to open in the dark.

Crocus with Parts in Fives.—From Mr. Elwes, F.R.S., came a crocus flower having ten perianth segments in two whorls, five stamens alternate with the outer perianth pieces, but a six-branched style.

Curious Mushroom.—Mr. Harris, of Denne Park, Horsham, sent a mushroom having a second complete but inverted mushroom attached to the pileus. The two had evidently become grafted together through contact in the early stages of growth, and the one had carried the other up as

its stalk lengthened, wrenching it away from the mycelium which gave it origin, the water, &c., necessary for growth of the inverted mushroom having been carried through the tissues of the one still attached to its mycelium.

"*Canker*" caused by *Monilia*.—Mr. Dunlop, of Armaghmore, sent a branch of apple 'Lord Derby' with cracked bark, giving it the appearance of incipient canker. Inspection revealed the greyish sclerotia of *Monilia fructigena* in the cracks, and Mr. Massee, V.M.H., said that this fungus, which is perennial in the tissues, forms sclerotia beneath the bark, causing the latter to be raised and to crack. Spores are formed on these sclerotia, and the disease is spread to the young leaves, shoots, flowers, and fruits by means of the spores.

Begonia Rust, &c.—Mr. Curtis sent leaves of *Begonia* 'Gloire de Lorraine' with rusty spots and markings on the leaves, due to the attack of the *Begonia* mite. This pest is difficult to eradicate, but constant vigilance and fumigation whenever necessary will usually keep it under. A good wash for dipping plants attacked by mites is made by kneading a handful of soft soap with a quantity of flowers of sulphur and dissolving the whole in one and one-half gallons of water; but even this, probably the most deadly wash for mites, and at the same time harmless so far as the plants are concerned, is not always efficient in killing the eggs of the mite.

Tuberous Solanums.—Mr. Sutton, V.M.H., read a paper on "Wild Types and Species of Tuber-bearing Solanums," illustrated by lantern slides.

He pointed out the peculiarities of the several tuber-producing species of *Solanum* which he had secured and grown during the past twenty years. *Solanum Maglia*, *S. Jamesii*, *S. Fendleri*, *S. Commersonii*, and *S. etuberosum* were all illustrated and their cultural characteristics commented upon. Experiments in hybridisation had been attempted, but with no good results. In 1906 for the first time fruits of *S. etuberosum* were discovered on one plant, and the seed gave rise to plants varying considerably among themselves just as seedlings of the potato of commerce vary. The fruit of this form is curiously spotted and the pollen is elliptical in the one seedling examined, like that of the wild types and unlike that of the cultivated. Mr. Sutton considers that this form is possibly the wild type from which the cultivated potato has sprung, and it is noteworthy that not once during the twenty years *S. etuberosum* has been in cultivation at Reading has it been attacked by the potato disease caused by *Phytophthora infestans*. There would thus seem a possibility of raising a race of potatoes immune from the attacks of that disease by cross-breeding with some of our common types.

Fog Injury.—Mr. Hales showed shoots of various plants from Chelsea showing injury through fog.

SCIENTIFIC COMMITTEE, MARCH 17, 1908.

E. A. Bowles, Esq., M.A., F.L.S., in the Chair, and fourteen members present.

Agave and Yucca diseased.—Mr. Saunders, F.L.S., showed a specimen of each of these plants attacked by a fungus. Mr. Güssow took these to examine (see p. xxxii).

Curious Root of Dandelion.—Mr. Holmes, F.L.S., showed a root of dandelion having numerous lateral roots springing at right angles from the main root, and very much thickened.

Inosculation in Hornbeam.—Messrs. J. Veitch sent branches of hornbeam (*Carpinus Betulus*), taken from a garden hedge, in which a very perfect junction had occurred between the two by a sort of natural inarching or inosculation, as it is more properly called. Mr. Elwes, F.R.S., drew attention to the fact that if young hornbeams are planted so as to form a lattice, as time goes on inosculation occurs wherever two stems come in contact, and finally an impenetrable hedge is formed.

Tubers of Sechium edule.—Large tuberous roots of this plant, grown from a tuber planted in a pot in the Melon House at Wisley, about the beginning of September, were shown by Mr. Chittenden. The plant had produced several large tubers, and these are said to be very palatable when cooked, and greatly resemble yams in appearance. The plant had been received under the name 'Chrystophine,' and is also called 'Choco.' The plants had not fruited at Wisley.

Crosses of Albino Orchids.—In reference to Mr. Hurst's communication (p. xxvi) to the last meeting upon this point Mr. Rolfe wrote:—" *Paphiopedilum insigne Sanderæ* × *P. bellatulum album* does not yield an albino hybrid (see 'Orchid Review,' 1908, p. 72), as should have been the case according to the theory mentioned by Mr. Hurst. It has very numerous minute purple dots on both the petals and dorsal sepal, though the ground colour is whiter, and the spots fewer and very much smaller than when the ordinary forms of the species are crossed. *P. bellatulum album* 'selfed' would, I have little doubt, come true, and *P. insigne Sanderæ* × *P. Lawrenceanum Hyeannum* I should expect to give coloured hybrids, because it is a precisely parallel cross to *P. insigne Sanderæ* × *P. callosum Sanderæ*, and combines the same quite distinct sections of the genus. In fact, *P. callosum* and *P. Lawrenceanum* (with, of course, their albino forms) are very intimately allied. The mysterious 'factor' supposed to be involved I believe to be simply the opportunity for reversion which is afforded by crosses between such diverse species. The two combinations last mentioned should certainly be attempted." (See p. xxx.)

Dwarf Form of Rhododendron triflorum.—From E. Magor, Esq., of St. Tudy, Cornwall, came a specimen of the dwarf form of *Rhododendron triflorum* raised at the Royal Gardens, Kew, from seed sent there by Mr. Peter Barr. The plant is not a foot high and flowers in Cornwall in the open from a month to ten weeks earlier than the type, the earliest date being the last week in February 1905.

Seeds germinating in Fruit.—From Mr. Cave, Holker Hall, Cark-in-Cartmel, came a fruit of tomato in which several of the seeds had

germinated, some of the seedlings having thrust their way out through the wall of the fruit and become green. The phenomenon is not very uncommon, and examples may at times be found in oranges, lemons, melons, and some other fruits, while in some plants, such as the mangrove, it normally happens that the seed germinates while the fruit containing it is still hanging attached to the plant, and the same thing has been recorded as occurring in *Sechium edule*.

Dominance and Reversion in Dendrobium Crosses.—Gurney Wilson, Esq., Haywards Heath, showed pseudo-bulbs of a cross-bred *Dendrobium*, and of its parents, *D. nobile Ballianum* ♀ × *D. nobile Murrhinianum* ♂. The pseudo-bulb of *D. nobile Ballianum* is straight, while that of the other parent is zigzag in growth, owing to the presence of a very marked projection at the nodes on each side of the pseudo-bulb alternately. Of 150 seedlings of this cross all showed in a marked manner in their pseudo-bulbs the zigzag character of the pseudo-bulb of *D. nobile Murrhinianum*. In both parents the flowers are white, but have a faint purplish spot in the centre of the throat. In all the 150 cross-bred plants the flower has reverted to the typical coloration of the species, the spot in the centre of the throat being dark, and the other perianth pieces being marked with purple.

SCIENTIFIC COMMITTEE, MARCH 31, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and twelve members present.

Inheritance of Albinism in Orchids.—Mr. Hurst, F.L.S., sent the following notes in relation to this subject (see p. xxix):—"Since my last communication I have had an opportunity of examining some plants of *Paphiopedilum insigne Sanderæ*. Much to my surprise, I found distinct traces of purple sap in the basal margins of both the old and the young leaves. The plants were not in flower, but I am told on good authority that some minute spots are also to be found on the dorsal sepal. In view of this it would appear that *P. insigne Sanderæ*, so long regarded as an albino, is in reality a coloured form in which the purple sap is present in minute quantities. In accordance with the provisional scheme suggested in my last note *P. insigne Sanderæ* will therefore be carrying both the colour factors C and P, and when mated with albinos may be expected to give coloured hybrids, as it has done in the case quoted by Mr. Rolfe. It would be interesting to know if the two other yellow forms *P. insigne Sanderianum* and *P. insigne Macfarlanei*, recorded as unspotted, are true albinos, and what they produce when crossed.

"If *P. insigne Sanderæ* is not an albino it must be deleted from my tables of albino crossings (p. xxvi), which will now read as follows:—

TABLE A.

1. *P. callosum Sanderæ* (P) × *P. callosum Sanderæ* (P) gives albinos (P P).
2. *P. Lawrenceanum Hyeatum* (P) × *P. Lawrenceanum Hyeatum* (P) gives albinos (P P).
3. *P. Lawrenceanum Hyeatum* (P) × *P. callosum Sanderæ* (P) gives albinos (P P).

4. *P. bellatulum album* (C) \times *P. callosum Sanderæ* (P) gives coloured hybrids (C P).
5. *P. bellatulum album* (C) \times *P. Lawrenceanum Hyeanum* (P) gives coloured hybrids (C P).

TABLE B.

1. *P. bellatulum album* (C) \times *P. bellatulum album* (C) should give albinos (C C).

Mr. Rolfe's theory that the colour reversions are due to the fact that the albinos crossed belong to diverse species fails to account for the cases in sweet peas, stocks, and other plants where two albino individuals of the same species, variety, and race may revert to coloured forms when crossed. On the other hand, the conception of complementary colour factors satisfactorily explains all the known phenomena of colour reversions in plants and animals, so far as they have been critically and experimentally studied."

Psocidae injuring Plants.—Some time since Mr. Stanton Brown, A.R.H.S., Breadsall, Derby, sent a number of insects from oleander, &c., which were identified as *Caccilius Dali* an insect belonging to the *Psocidae*, and known only to feed upon spores of fungi and similar things. Mr. Brown now sent some pieces of recently struck cuttings of *Salvia splendens* upon which the insects occurred in great numbers. These cuttings were injured by insects, and Mr. Brown said that the injury was solely due to the work of these insects, which did not appear at all particular with regard to the plants upon which they feed. This adds another to the already long list of insect pests in plant houses. Mr. Saunders, F.L.S., took the plants for further examination.

Larch with Gall-like Growths.—Mr. Elwes, F.R.S., showed a one-year-old shoot of larch taken from a young tree in his nursery having gall-like growths along several inches of its length. The shoot was referred to Mr. Massee, V.M.H., who undertook to obtain some information upon it if possible.

Orchid Hybrids.—Mr. Rolfe, A.L.S., on behalf M. E. Cappe, Vésinet, France, exhibited two very diverse hybrids raised from the same seed pod of *Laelio-Cattleya Cappei* (a hybrid from *L. cinnabarina* \times *C. Warscewiczii*), the result of fertilising a flower with mixed pollen from *Laelia flava* and *Cattleya Mendelii*. One flower appeared to be a true hybrid between *L.-C. Cappei* and *C. Mendelii*, whose characters were well blended, but the other closely resembled *Laelia Cowani* (a supposed hybrid between *L. flava* and *L. cinnabarina*) in size. It was suggested as a case of dissociation of the "mixed character" whereby an ovule of *L.-C. Cappei*, from which the character of *C. Warscewiczii* had been eliminated, had been fertilised by a pollen tube from *Laelia flava*.

Fruit of Euonymus japonicus.—Thomas Peed, Esq., High Cliff, Ventnor, I.W., sent fruits of *Euonymus japonicus*. This plant not uncommonly produces ripe fruits in this country, and Mr. Chittenden said he had on one occasion found a seedling on the town rubbish heap at Chelmsford.

Scale Insect on Holly.—Mr. Saunders, F.L.S., reported that the insect attacking holly from Ipswich was the very local scale insect, *Aspidiotus britannicus*. He recommended that the holly hedge should be thoroughly sprayed with paraffin emulsion, taking care that both

surfaces of the leaves received the spray ; or the hedge might be fumigated with hydrocyanic acid gas if some means of enclosing it could be devised.

Yucca and Agave Disease.—Mr. Gussow reported that he had examined the leaves of yucca and agave shown at the last meeting by Mr. Saunders, and found they were attacked by the fungus *Coniothyrium concentricum*, a common fungus in America, and previously recorded in this country. He recommended that to stop its spread the leaves should be dipped in a one per cent. solution of copper sulphate.

Journal and Scientific Papers.—After some discussion initiated by Mr. Elwes, Mr. Wilks moved and Mr. Holmes seconded :—

"That the Scientific Committee would be greatly pleased if it would be possible for the Council to publish annually a volume equivalent to one part of the Journal containing only papers of definite scientific value. They consider that the writers of really scientific papers are unwilling to come forward when they know their productions will be mixed up with ordinary horticultural matters, but they believe if they were issued separately scientific men would willingly come forward." But the matter was adjourned to the next meeting.

SCIENTIFIC COMMITTEE, APRIL 14, 1908.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, and nine members present.

Funnel-shaped Outgrowth in Ivy.—Mr. Worsdell, F.L.S., showed a leaf of ivy having a funnel-shaped growth proceeding from near the base, similar to that often seen in cabbages, but in this case it grew from the lower surface.

Double-spathed Richardia.—G. Siggs, Esq., F.R.H.S., of Streatham Hill, sent an inflorescence of *Richardia ethiopica* with a second full-sized leaf proceeding from the flowering stem, about 8 inches below the normal spathe, of a white colour, except at the tip. The phenomenon is common, but was particularly well marked in this specimen.

Potato-disease Fungi.—Mr. Masee, V.M.H., showed specimens of potato tubers affected with "winter rot," with the fungus *Nectria Solani*, which is the cause of the disease, growing thereon, remarking that it had been particularly prevalent during the past season ; a fact that he attributed partly to the prevalence of rain during the last summer and the difficulty of thoroughly drying the tubers before they were stored. This fungus had recently, he said, been described under another name by an investigator ; a condition of things found not alone in this disease, for recently the fungus long ago described by Berkeley (see "Journ. Roy. Hort. Soc." vol. i. 1846, p. 88, figs. 80, 81) under the name of *Tubercinia scabies*, and now known as *Sorosporium scabies* Fisch., one of the causes of potato scab, had been apparently rediscovered and renamed as new, *Sporospora Solani* on the Continent, and this name had been taken up by some botanists in England and Ireland as the newly discovered cause of potato scab.

Propagation of Drosera.—Mr. Hales showed plants of *Drosera hilaris* raised from root cuttings put in about five weeks ago. The plants had each developed a number of leaves.

Hybrid Orchids.—R. G. Thwaites, Esq., F.R.H.S., of Streatham Hill, S.W., wrote in reference to the communications recently received by the Committee concerning the crossing of albino orchids:—"The result of crossing *Dendrobium Wiganianum album* (in which the peduncle is only slightly coloured) with *D. nobile virginale* (which is white all through) has been, in every instance, a coloured flower of the ordinary *D. nobile* type; whilst *D. nobile virginale* self-fertilised has in every instance produced pure-white flowers, appearing to prove that *D. Wiganianum album* is not a true albino. Again, when *D. nobile virginale* is crossed with *D. aureum* in every instance the same result is obtained as from crossing the ordinary *D. nobile* with *D. aureum*, namely, *D. Ainsworthii*, the flowers of which are full of colour."

Gall-like Growths of Larch.—Mr. Massee, V.M.H., reported that the gall-like growths on the larch shoot shown by Mr. Elwes at the last meeting were really the scales of a female cone which had been separated from one another by the growth of internodes. They had apparently been early attacked by *Thrips abietis*. Seeds and seed scales were both to be found in their axils.

Seedling Elm.—Mr. Chittenden showed a seedling of *Ulmus glabra* from Terling, where they had occurred in abundance last season (see "Kew Bulletin," 10, 1907, p. 404). This elm is abundant in many parts of Essex, but only once before had he found a seedling, and that in his garden at Chelmsford in 1903. *U. campestris*, of which this is probably a form, is not known to seed in England, unless the seedlings recorded from the King's College "Backs" should prove to be really those of that tree.

Journal and Scientific Papers.—The motion on this subject adjourned from the last meeting (p. xxxii) was again brought before the Committee by Mr. Holmes, seconded by Mr. Massee, and, after discussion, carried, four voting in its favour and none against.

The motion was ordered to be sent to the Council.

SCIENTIFIC COMMITTEE, APRIL 28, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, and eight members present.

Daffodil Seedlings.—Rev. G. Engleheart, V.M.H., sent the following communication concerning the white seedling daffodils shown by him:—"During the past twenty years I have several times, in successive years, cross-fertilised *Narcissus* 'M. J. Berkeley' ♀ on a considerable scale in order to obtain a race of early, coloured *N. incomparabilis* and in this I have been successful. But in each set, when it reached the flowering stage, there have appeared some of these white trumpets, virtually 'M. J. Berkeley' itself except in colour. There has always been also a sprinkling of yellow trumpets, i.e., 'M. J. Berkeley' itself, reproduced from seed of a few flowers which escaped being totally disanthered, and the

whites, I am convinced, originated in the same way. They were not produced by pollen of any white trumpet being conveyed to the stigma of 'M. J. Berkeley,' and my reasons for this statement are: (1) no white trumpets were grown near, and few, if any, were in bloom so early as 'M. J. Berkeley'; (2) early white trumpets, such as *N. cernuus*, invariably in my large experience, modify the form of the ♀ parent; and (3) the appearance of flowers of this same character in every batch of seedlings points to a uniform internal cause in 'M. J. Berkeley' itself. Not only the form of the flower, but the foliage, stature, general habit, and precise period of bloom are 'M. J. Berkeley' in counterpart.

"The variety 'M. J. Berkeley' was raised by Messrs. Backhouse about 1840, and is pretty obviously a self-fertilised seedling from *N. maximus*, which in its turn is a wild species indigenous on the French side of the lowland Pyrenees. I have had bulbs direct from the wild habitat, and have been in correspondence with a good botanist who has seen the plants in bloom there, but I have never heard of any white wild variety of *N. maximus*. I have myself raised from self-fertilised seed of *N. maximus* a flower somewhat similar to 'M. J. Berkeley,' and that form has no appearance in any single feature of being the result of a cross with one of the white trumpet section. Personally I have no doubt whatever that this is a sudden 'spontaneous' break to white from yellow.

"The nearest analogy I can adduce is the occasional appearance of a pure-white form in wild beds of the yellow Pyrenean *N. muticus*, quite reproductions, in every feature but colour, of *muticus* itself. No white trumpet daffodil exists in the same zone as *N. muticus*, the little wild white *N. moschatius* being thousands of feet higher in a remote valley.

"I have no reason whatever to suppose that there is any white hybrid blood in the ancestors of 'M. J. Berkeley,' *i.e.*, that these white seedlings exhibit a reversion to ancestral character. It seems more likely to be an instance of a sudden 'mutation' from yellow to white in colour progress. It is interesting to note that precisely the same thing has been noticed in New Zealand in seedlings of 'M. J. Berkeley.'"

Seedlings of Gnetum.—Mr. Hales showed seedlings of *Gnetum Gnemon*, grown at the Chelsea Physic Garden, exhibiting the foot which absorbs the food stored in the seed for the nourishment of the growing seedling; this foot is developed only to a very slight degree in some other gymnosperms such as *Ephedra* (see p. 41).

Delayed Flowering of Amaryllis.—Mr. Odell showed some flower buds of *Amaryllis Belladonna* which were now appearing. The flowering had been delayed in many cases in the autumn, apparently through the short suitable season. Mr. Baker states that the normal period of flowering was in April in the native habitat, but this statement was called in question.

Floral Malformations.—Mr. Bowles, M.A., showed on behalf of Messrs. Hogg & Robertson, of Dublin, a malformed flower of *Narcissus* 'J. T. Bennett-Poë.' The parts of the perianth and the stamens were each nine, and springing from the base of the style was a narrow tubular growth embracing what appeared to be a secondary style. This flower and a double-spathed *Caladium*, 'L. A. Van Houtte,' somewhat similar in structure to the double-spathed *Richardia* shown at the last meeting,

exhibited by Messrs. Veitch, of Chelsea, were referred to Mr. Worsdell, F.L.S., for further examination.

Pyronia 'John Seden.'—Messrs. J. Veitch showed fruits of one of the hybrids previously exhibited before the Committee in the autumn. The fruits of this hybrid were quince-like in appearance, and had a remarkably pleasant aroma, but were still quite hard.

Snowdrop Bulbs.—Brodie of Brodie, Brodie Castle, Forres, sent two snowdrops with the newly formed bulbs produced at a distance of two inches above the original bulbs, with which they were connected by means of a tube formed by sheathing membranous leaves.

Journal and Scientific Papers.—A reply was received from the Council acknowledging the receipt of the resolution sent up from the last meeting and deferring any action thereupon for the present.

FLORAL COMMITTEE.

JANUARY 14, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To MESSRS. Cutbush, Highgate, for alpinas and retarded plants.
To MESSRS. Low, Bush Hill Park, for Carnations, &c.

Silver-gilt Banksian Medal.

To MESSRS. Veitch, Chelsea, for winter-flowering greenhouse plants.

Silver Banksian Medal.

To MESSRS. Peed, Streatham, for alpinas.
To Mr. L. R. Russell, Richmond, for hardy evergreen shrubs.

Other Exhibits.

Misses Hopkins, Shepperton : alpine and rock plants.

FLORAL COMMITTEE, JANUARY 28, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To MESSRS. May, Upper Edmonton, for ferns and foliage plants.

Silver Flora Medal.

To MESSRS. Cannell, Swanley, for Primulas.
To MESSRS. Cutbush, Highgate, for alpinas, Carnations, &c.
To Miss Farrer, Acton, for flower paintings.
To MESSRS. Sutton, Reading, for Cyclamen.
To MESSRS. Waterer, Bagshot, for hollies.

Silver Banksian Medal.

To Mr. Burnett, Guernsey, for Carnations.
To MESSRS. Low, Bush Hill Park, for Cyclamen.
To Mr. Russell, Richmond, for hardy shrubs.

Bronze Banksian Medal.

To Mrs. Miller, Marlow, for flower paintings.
To Miss Sumner Jones, Chiswick, for studies of the Dandelion.

Award of Merit.

To *Nephrolepis exaltata* var. *AmerpohlII* (votes, 15 for, 1 against), from Messrs. May, Upper Edmonton. A sport from *N. exaltata* var. *Whitmanii*, possessing the beautifully plumose fronds of that variety, but differing in its more compact form and sturdier habit.

Other Exhibits.

Messrs. Barr, Covent Garden : spring flowers.

Misses Hopkins, Shepperton : rock plants.

Messrs. Peed, Streatham : Primulas and alpinas.

Mr. Reuthe, Keston : alpinas, &c.

Mr. Upton, Guildford : shrubby Veronicas, &c.

FLORAL COMMITTEE, FEBRUARY 11, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Mr. W. H. Page, Hampton, for Carnations and Lilies.

To Messrs. Veitch, Chelsea, for Carnations and Primulas.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Primulas.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To Messrs. Low, Bush Hill Park, for Carnations and Cyclamen.

To Mr. Seward, Hanwell, for Cyclamen.

To Messrs. Sutton, Reading, for Primulas.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for alpinas and Carnations.

To Mr. Gill, Falmouth, for Rhododendrons.

To E. A. Hambro, Esq. (gr. Mr. Grandfield), Hayes, for Primulas and Cyclamen.

To Messrs. May, Edmonton, for hardy ferns.

Silver Banksian Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Mr. G. Reuthe, Keston, for alpinas.

Bronze Flora Medal.

To Mr. L. R. Russell, Richmond, for hardy shrubs.

To St. George's Nursery Co., Harlington, Middlesex, for Cyclamen.

To Messrs. Ware, Feltham, for hardy flowers.

Award of Merit.

To strain of Cyclamen 'Salmon King' (votes, 18 for, 2 against), from Messrs. Low, Bush Hill Park. An improved strain raised from 'Salmon

Queen,' flowers medium-sized, with rather narrow segments, but of a distinct rich shade of salmon-pink.

Other Exhibits.

Messrs. Barr, Covent Garden : spring flowers.

Messrs. Carter, High Holborn : Primulas.

Mr. Chapman, Rye : Freesias and bulbous Irises.

Messrs. Heath, Cheltenham : Carnation 'Gwladys.'

Misses Hopkins, Shepperton : spring flowers.

P. A. Molteno, Esq., Cape Town : cut flowers of Cape Ericas and Proteas.

Mr. W. Palmer, Andover : Primulas.

Messrs. Peed, Streatham : alpinas and Lachenalias.

Mr. R. Sydenham, Birmingham : Lilies of the Valley.

Mr. A. R. Upton, Guildford : Veronicas and Ericas.

Messrs. Waterer, Bagshot : conifers.

Mr. W. Welchman, Wisbech : a new variety of Narcissus.

FLORAL COMMITTEE, MARCH 3, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and thirty-three members present.

Awards Recommended :—

Gold Medal.

To Messrs. Cuthbert, Southgate, for forced shrubs.

Silver-gilt Lindley Medal.

To Lady Tate, Streatham Common (gr. Mr. Howe), for forced bulbs.

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for forced shrubs, alpinas, Carnations, &c.

To Messrs. Hill, Edmonton, for ferns.

To Messrs. Veitch, Chelsea, for greenhouse plants and forced shrubs.

Silver Flora Medal.

To Messrs. Low, Bush Hill Park, for Acacias, Carnations, alpinas, &c.

To Messrs. May, Edmonton, for ferns and flowers.

To Mr. Mount, Canterbury, for Roses.

To Messrs. W. Paul, Waltham Cross, for Camellias.

To Mr. Russell, Richmond, for forced shrubs.

Silver Banksian Medal.

To Lord Hillingdon, Uxbridge (gr. Mr. Allan), for Lachenalias.

Bronze Flora Medal.

To Messrs. Cannell, Swanley, for Pelargoniums and Primulas.

To Mr. W. H. Page, Hampton, for Carnations and Lilies.

To Messrs. Paul, Cheshunt, for forced Lilacs and alpinas.

To Mr. Reuthe, Keston, for alpinas, &c.

Award of Merit.

To *Helleborus* 'Peter Barr' (votes, 16 for, 8 against), from Messrs. Barr, Covent Garden. A seedling from *H. colchicus*, with large flowers of a rich blackish-purple, and with a vigorous habit, 15-18 inches.

Other Exhibits.

- A. Brassey, Esq., Chipping Norton : Violets.
- J. Brookland, Esq., Bilton : *Eranthis hyemalis fl. pl.*
- Messrs. Brooks, Basingstoke : Primulas.
- Mr. Burnett, Guernsey : Carnations.
- Mr. Chapman, Rye : Freesias and bulbous Irises.
- Messrs. Cheal, Crawley : herbaceous plants.
- H. J. Elwes, Esq., Colesborne : *Gardenia citriodora*.
- Miss Farrer, East Acton : floral studies.
- Mr. R. Gill, Falmouth : Rhododendrons.
- Messrs. Heath, Cheltenham : alpinas and Primulas.
- Misses Hopkins, Shepperton : alpinas, &c.
- Messrs. Jackman, Woking : alpinas.
- Misses Kipping, Hutton : alpinas.
- Lady Lewis, Kington : Violets.
- F. W. Moore, Esq., V.M.H., Glasnevin : new Lachenalias.
- Messrs. Peed, Streatham : alpinas, &c.
- Mrs. Sanders, Yeovil : *Hippeastrum* 'Dorothea.'
- Miss Smith, Bognor : spring flowers.
- Mr. R. Sydenham, Birmingham : Lilies of the Valley.
- Mr. Upton, Guildford : hardy plants.
- Messrs. Veitch, Exeter : heaths, &c.
- Messrs. Wallace, Colchester : alpinas.
- Messrs. Ware, Feltham : alpinas.
- Miss West, Tunbridge Wells : pictures.
- Mr. Wilkinson, Minchin Hampton : hybrid Cyclamen.
- Lord Zouche, Pulborough (gr. Mr. Spillard) : Cyclamen.

FLORAL COMMITTEE, MARCH 17, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Gold Medal.

To Messrs. Veitch, Chelsea, for forced shrubs, Cyclamen, &c.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for forced plants, alpinas, &c.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To E. A. Hambro, Esq. (gr. Mr. Grandfield), Hayes, for alpinas, &c.

To Messrs. May, Edmonton, for Clematis, &c.

Silver Flora Medal.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Low, Bush Hill Park, for Carnations and Acacias.

To Mr. Mount, Canterbury, for Roses.

To Mr. L. R. Russell, Richmond, for Clematis and forced shrubs.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for spring flowers.

To Messrs. Cannell, Swanley, for zonal Pelargoniums.

To Mr. Page, Hampton, for Carnations and Lilies.

To Messrs. W. Paul, Waltham Cross, for forced flowering peaches and almonds.

Bronze Flora Medal.

To Mrs. Barton (gr. Mr. Streeter), Bramley, Guildford, for Cinerarias, &c.

To Mr. G. Reuthe, Keston, for spring flowers.

To St. George's Nursery Co., Harlington, for Cyclamen.

To Messrs. Ware, Feltham, for alpinas.

Bronze Banksian Medal.

To Mr. R. Sydenham, Birmingham, for Lilies of the Valley.

Other Exhibits.

Messrs. Cheal, Crawley: hardy plants.

H. J. Elwes, Esq., Colesborne: *Primula nivalis* var. *macrophylla*.

Miss Farrer, Acton: floral studies.

Misses Hopkins, Shepperton: alpinas.

Messrs. Jackman, Woking: spring flowers.

Messrs. Jarman, Chard: Cactus Cinerarias.

Misses Kipping, Hutton: Primroses.

Sir E. Loder, Bart. (gr. Mr. Cook), Leonardslee: *Ilex cornuta*, with berries.

E. J. P. Magor, Esq., St. Tudy: *Rhododendron triflorum*, dwarf form.

Messrs. Peed, Streatham: hardy plants.

Mr. H. Pulham, Stanstead: rock plants.

Miss Smith, Bognor: spring flowers.

Messrs. Sutton, Reading: Cinerarias.

Mr. Upton, Guildford: hardy plants.

FLORAL COMMITTEE, MARCH 31, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. Burnett, Guernsey, for Carnations.

To Mr. L. R. Russell, Richmond, for forced shrubs.

To Messrs. R. Smith, Worcester, for Clematis, &c.

To Messrs. Veitch, Chelsea, for greenhouse plants and forced shrubs.

Silver-gilt Banksian Medal.

To Messrs. Bell and Sheldon, Guernsey, for Carnations.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Carnations and alpinas.

To Messrs. Low, Bush Hill Park, for Carnations, &c.

To Mr. G. Mount, Canterbury, for Roses.



FIG. 13.—IRIS SIND-PUR 'AMETHYST.' (*Journal of Horticulture*.)

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for zonal Pelargoniums.

To Messrs. Cuthbert, Southgate, for Hyacinths.

To Mr. R. Felton, Hanover Square, for Roses.

To Messrs. May, Edmonton, for Cinerarias, &c.

To Mr. W. H. Page, Hampton, for Carnations.

Bronze Flora Medal.

To Messrs. Frank Cant, Colchester, for Roses.

To Mr. A. F. Dutton, Iver, for Carnations.

To Mr. R. E. Gill, Falmouth, for Rhododendrons.

To Messrs. Peed, Streatham, for Caladiums, &c.

To Mr. Reuthe, Keston, for alpinos, &c.

To Messrs. Wallace, Colchester, for alpinos.

To Messrs. Ware, Feltham, for alpinos.

Bronze Banksian Medal.

To the Misses Hopkins, Shepperton, for alpinos.

Award of Merit.

To *Iris sind-pur* 'Amethyst' (votes, 18 for, 4 against), from Mr. C. G. van Tubergen, jr., Haarlem. One of a series of hybrids resulting from *I. sindjarensis* × *I. persica purpurea*, resembling the

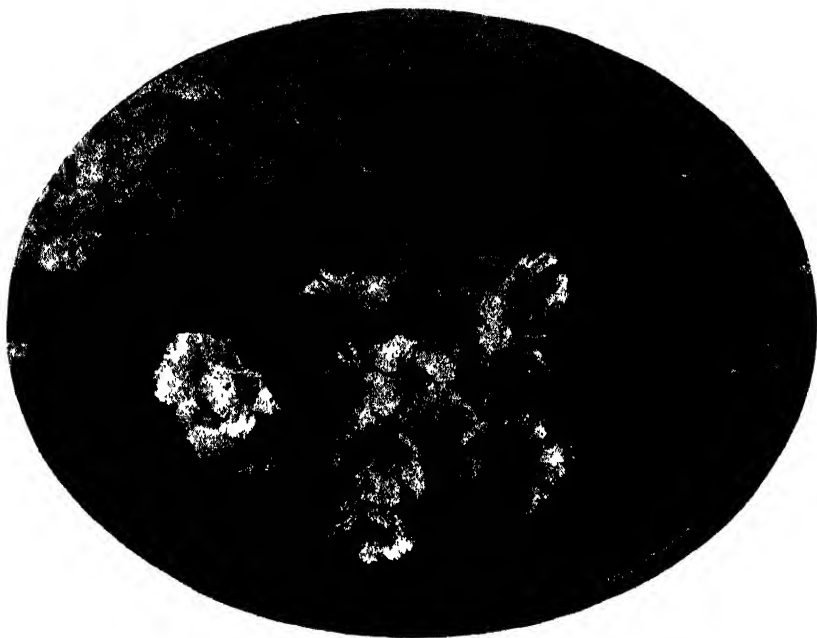


FIG. 14.—*SHORTIA UNIFLORA*.

former in habit and in the size and form of flower. The plants shown were very vigorous, bearing four to six flowers of a delicate translucent mauve. The falls have a distinct creamy-yellow median ridge, and are paler blue with a few more deeply coloured veins. (Fig. 13.)

To *Rhododendron* 'Purity' (votes, 18 for, 1 against), from Mr. C. Turner, Slough. A greenhouse variety, said to have been raised from *R. Edgeworthii* × *R. Gibsonii*. Flowers large and pure white, with the exception of a pale yellow blotch about the nectary. Habit dwarf and free-flowering.

To *Shortia uniflora* (votes, unanimous), from Messrs. Wallace, Colchester. A Japanese species, differing from the more common North American *S. galacifolia* in its larger and more open flowers, which are of variable shades of rose. Those exhibited were blush-pink, freely borne among the scantily developed foliage. (Fig. 14.)

To *Viola gracilis* (votes, unanimous), from Messrs. Wallace, Colchester. A species from Greece, introduced early last century, but still very scarce in gardens. The flowers are about an inch and a half across, deep violet in colour, with a very small white eye and a long curved spur. The leaves vary from oblong linear to spatulate and are almost entire. Stipules leafy, pinnatifid. (Fig. 15.)



FIG. 15.—*VIOLA GRACILIS*. (*The Garden*.)

Other Exhibits.

- Messrs. Barr, Covent Garden : alpines.
- Mr. Ben. Cant, Colchester : Rose 'White Dorothy.'
- Messrs. Clark, Dover : rock plants.
- Miss Dixon, Westergate : Violets.
- Mr. C. Foster, Reading : Sweet Peas.
- Mr. F. Galsworthy, Chertsey : floral studies.
- Messrs. Heath, Cheltenham : Pelargoniums.

Misses Kipping, Hutton : alpinas.

Mary Countess of Ilchester, Dorchester : rare flowering trees and shrubs.

Major Lister, Hayward's Heath (gr. Mr. Baker) : *Hippeastrums*.

W. North-Row, Esq., Tiverton : *Ceanothus buxifolius*.

Messrs. Paul, Cheshunt : new shrubs.

Mr. Pulham, Elsenham : rock plants.

Miss Smith, Bognor : spring flowers.

Messrs. Sutton, Reading : *Hyacinths*.

Mr. A. R. Upton, Guildford : hardy plants.

J. Whitaker, Esq., Palermo : a new violet.

FLORAL COMMITTEE, APRIL 14, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Gold Medal.

Mr. George Mount, Canterbury, for Roses.

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for alpinas, Carnations, &c.

To A. de Rothschild, Esq., Halton, Tring (gr. Mr. Sanders), for *Hippeastrums*.

Silver-gilt Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations, Acacias, &c.

To Mr. W. H. Page, Hampton, for Carnations and Lilies.

To Messrs. Veitch, Chelsea, for greenhouse plants, &c.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for zonal *Pelargoniums*.

To Messrs. May, Edmonton, for flowering plants and ferns.

To Messrs. W. Paul, Waltham Cross, for new Roses.

To Mr. L. R. Russell, Richmond, Surrey, for forced plants.

Silver Banksian Medal.

To Sir Edmund Loder, Bart., Leonardslee (gr. Mr. Cook), for *Rhododendrons*.

To Messrs. Paul, Cheshunt, for Roses and shrubs.

To Mr. Prichard, Christchurch, for alpinas.

Bronze Flora Medal.

To Messrs. Cripps, Tunbridge Wells, for Japanese Maples.

To Mr. A. F. Dutton, Iver, for Carnations.

To Mr. G. Reuthe, Keston, for alpinas and rare shrubs.

To Mr. C. Turner, Slough, for *Caladiums*.

To Messrs. Wallace, Colchester, for alpinas.

To Messrs. Ware, Feltham, for alpine, &c.

To Mr. C. F. Waters, Balcombe, for Carnations.

Award of Merit.

Aspidium (= *Cyrtomium*) *falcatum* var. *Mayi* (votes, unanimous), from Messrs. May, Edmonton. This is a "seedling" that originated in the Nursery, and is the first exhibited variety of *A. falcatum* with branched and crested fronds.

To *Viburnum Carlesii* (votes, unanimous), from Sir Trevor Lawrence, Bart., Dorking. A new species from Corea, with terminal cymes of pure white scented flowers. Leaves broadly ovate, grey-green above and covered beneath, like the young shoots, with a brownish stellate tomentum. The flower trusses are 8 to 4 inches across, the individual flowers about half an inch in diameter, with a cylindric tube of the same length.

Other Exhibits.

H. D. Broughton, Esq., Andover : Calceolarias.

Messrs. Bruce, Strand, W.C. : floral studies.

Messrs. Bull, Chelsea : ornamental foliage plants.

Messrs. Carter, Holborn : Cinerarias.

Messrs. Carter, Page, London Wall : Violas.

Messrs. Cheal, Crawley : hardy plants.

Messrs. Clark, Dover : hardy plants.

Messrs. Collingridge, Aldersgate Street : three-colour process of reproduction.

Mr. J. Crook, Camberley : Polyanthus.

Misses Hopkins, Shepperton : spring flowers.

Messrs. Jackman, Woking : hardy plants.

Misses Kipping, Hutton : spring flowers.

Messrs. Peed, Streatham : alpine.

Mr. H. C. Pulham, Stansted : rock plants.

The Redlands Co., Emsworth : new plants.

Miss Smith, Bognor : spring flowers.

Duchess of Somerset, Bath : Rose 'Lamarque.'

Mr. A. R. Upton, Guildford : hardy plants.

W. G. Vivian, Esq., Clyne Park, Blackpill : Rhododendrons.

Mr. W. A. Watts, Bronwyf : blue Primroses.

Mr. J. Webb, Edgbaston : *Arabis alpina variegata compacta* 'James Webb.'

Mr. W. H. Young, Romford : *Coleus* vars.

FLORAL COMMITTEE, APRIL 28, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and forced plants.

To Mr. Mount, Canterbury, for Roses.

To Messrs. W. Paul, Waltham Cross, for Roses.

To Mr. L. R. Russell, Richmond, for forced shrubs, foliage plants, &c.

Silver Flora Medal.

To Messrs. Carter, High Holborn, for Cinerarias.

To Messrs. R. and G. Cuthbert, Southgate, for forced shrubs.

To Messrs. May, Edmonton, for flowering plants and ferns.

To Mr. W. H. Page, Hampton, for Carnations and Lilies.

To Messrs. J. Veitch, Chelsea, for greenhouse flowering plants.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for herbaceous plants.

To Messrs. Cannell, Swanley, for zonal Pelargoniums.

To Messrs. Frank Cant, Colchester, for Roses.

To Messrs. Carter, Page, London Wall, for Violas and Pansies.

To Messrs. Dobbie, Rothesay, for Violas and Polyanthus.

To Misses Hopkins, Shepperton, for rock plants.

To Messrs. Low, Bush Hill Park, for *Metrosideros*, Roses, &c.

To Messrs. Peed, Streatham, for Gloxinias.

To Mr. M. Prichard, Christchurch, for alpines.

To Mr. G. Reuthe, Keston, for alpines, Rhododendrons, &c.

To Mr. Waters, Balcombe, for Carnations.

First-class Certificate.

To *Hippeastrum* 'Purity' (votes, unanimous), from Mrs. Burns, North Mymms Park, Hatfield (gr. Mr. Fielder). Flowers large, of very fine form, pure white. Habit vigorous, each flower-stem bearing three to five flowers, and the bulbs promising a number of offsets. The bulbs were said to have flowered for the last three years without showing a trace of red in the flowers.

Award of Merit.

To *Aubrietia* 'Lavender' (votes, 15 for, 4 against), from Mr. Prichard, Christchurch. Flowers nearly an inch in diameter, lavender-blue with small white eye; habit vigorous, very floriferous.

To *Auricula* 'Phyllis' (votes, 16 for), from Mr. Douglas, Great Bookham. A vigorous alpine variety, with large flowers of excellent form; paste very white, ground-colour reddish-purple shading to a neat lilac-purple edge.

Other Exhibits.

Messrs. Barr, Covent Garden: alpines.

Mr. J. R. Box, West Wickham: alpines.

Hon. F. Bowes-Lyon, Taunton: *Cyclamen persicum* fl. pl.

Messrs. Bull, Chelsea: stove foliage plants.

Messrs. Cheal, Crawley: Lilacs, &c.

Messrs. G. and A. Clark, Dover: alpines.

Mr. J. Douglas, Great Bookham: *Myosotidium nobile*.

H. J. Elwes, Esq., V.M.H., Colesborne: rare shrubs.

F. Du Cane Godman, Esq., Horsham: greenhouse Rhododendrons, *Posoqueria*, &c.

Mrs. Godwin-Austen, Godalming : Primrose 'Nore Rose du Barry.'

Messrs. Jackman, Woking : alpine.

Misses Kipping, Hutton : rock plants.

Sir E. Loder, Bart., Leonardslee : *Ribes sanguineum fl. pl.*

Major H. Neve, Cranbrook : varieties of primrose.

Messrs. Paul, Cheshunt : forced shrubs.

L. C. Ravens, Esq., Tooley Street : *Anthurium Scherzerianum* var.

W. Shuter, Esq., Hampstead : seedling Clivias.

Miss Talbot, Berkhamstead : *Echium callithyrsum*.

Rev. A. R. Upcher, Halesworth : Polyanthus.

Mr. A. R. Upton, Guildford : alpine.

Messrs. Ware, Feltham : hardy plants.

Mr. W. A. Watts, St. Asaph : varieties of primrose.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 14, 1908.

Mr. A. H. PEARSON in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Cannell, Swanley, for Apples.

Silver Banksian Medal.

To F. Bibby, Esq., Hardwicke Grange, Salop (gr. Mr. Taylor), for Pears.

To Miss Martin, Willowbrook, Auburn, New York, for bottled fruit.

Other Exhibit.

Mr. Read, Cadbyrie House, Ealing, W.: Apple 'Somerset Orange Pippin.'

FRUIT AND VEGETABLE COMMITTEE, JANUARY 28, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Mrs. Denison, Little Saddesen, Berkhamstead (gr. Mr. Gentle), for collections of Potatos and Onions.

Silver Knightian Medal.

To Messrs. Peed, West Norwood, for Apples.

Other Exhibits.

A. W. Sutton, Esq., Bucklebury Place, Berks (gr. Mr. Harris) : Tomatos.

The Hon. C. Harbord, Gunton Park, Norwich (gr. Mr. Allan) : Pear 'Blickling.'

Mr. Baylor Hartland, Ardcairn, Cork : 'April Queen' Apple.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 11, 1908.

Mr. A. H. PEARSON in the Chair, and twenty members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for a very fine collection of Potatos.

Silver Knightian Medal.

To Messrs. Rivers, Sawbridgeworth, for Oranges.

Bronze Banksian Medal.

To W. Roupell, Esq., Harvey Lodge, Roupell Park, S.W., for Apples.

Cultural Commendation.

To W. Roupell, Esq., Harvey Lodge, for four dishes of Apples.

Other Exhibits.

Mr. H. Wigley, Whitehill, Gravesend : Cherry wine made from Morello Cherries, not specially good in flavour.

Mr. T. Carter, Butleigh Court, Glastonbury : a variety of Apple very similar to some of the forms of 'Blenheim Orange.'

Mr. J. Crook, Camberley : an unknown Apple of no special merit.

Mr. Cooper, Stud House Gardens, Hampton Court : an Apple very similar to 'Barnack Beauty.'

Messrs. Barr, Covent Garden : ornamental Kales.

Mr. Dixon, Holland House Gardens, Kensington : a seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, MARCH 8, 1908.

Mr. A. DEAN, V.M.H., in the Chair, and nineteen members present.

Exhibits.

T. B. T. Hildyard, Esq., Flintham Hall, Newark (gr. Mr. Longstone) : three dishes of Apples.

Mr. Peters, Givons Gardens, Leatherhead : two dishes of Apples and one of Pears.

Lord Zouche, Parham Park, Pulborough (gr. Mr. Spillard) : ten dishes of Apples.

FRUIT AND VEGETABLE COMMITTEE, MARCH 17, 1908.

Mr. OWEN THOMAS, V.M.H., in the Chair, and seventeen members present.

Award Recommended :—

Silver-gilt Knightian Medal.

To Mr. Ansell, Cyprus, for Oranges and Lemons.

Other Exhibits.

A small collection of Apples from the Government of Nova Scotia was sent for comparison in flavour with British-grown fruit from Messrs. Bunyard, Maidstone, and A. Dean, Esq., V.M.H., Kingston-on-Thames. The British Apples were much superior in flavour and juiciness to those from Nova Scotia, the best British varieties being 'Lord Burghley,' 'Wagener,' 'Newton Wonder,' 'Lord Hindlip,' and 'King of Tomkins County.'

FRUIT AND VEGETABLE COMMITTEE, MARCH 31, 1908.

Mr. A. DEAN, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver Knightian Medal.

To C. F. Raphael, Esq., Porter's Park, Shenley (gr. Mr. Grub), for Strawberries.

To Messrs. Rivers, Sawbridgeworth, for Oranges.

Award of Merit.

To Orange 'The Navel' (votes, unanimous), from Messrs. Rivers, Sawbridgeworth. Fruit round, pale yellow, medium size, very thin rind ; flesh full of juice and of delicious flavour.

Cultural Commendation.

To Miss C. M. Dixon, Westergate, Chichester, for Strawberries.

Mr. J. Lyne, Foxbury, Chislehurst, brought some Strawberry plants grown in pots, in which the crowns had split and had become useless. It was stated that one grower had lost 4,000 pot plants in this way out of 20,000 ; it was further stated that neither the pots nor plants had received any protection. The Committee considered that if the pots had been plunged in ashes or similar material the damage would not have occurred, and that it is imperative that the pots should be protected ; otherwise the "crowns" will split through the action of frost and cold winds following rain in the winter months.

FRUIT AND VEGETABLE COMMITTEE, APRIL 14, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Cultural Commendation.

To Mr. T. E. Dawes, Syderstone, King's Lynn, for Rhubarb 'Dawes' Challenger.' The Committee asked for stock to be sent to Wisley.

Other Exhibits.

The Duke of Rutland, Belvoir Castle (gr. Mr. Divers) : Pear 'Marie Guise.'

Sir E. G. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook) : Apples and Pears.

Dr. Newington, Ticehurst : two seedling Apples.

Mr. J. Cheal, Crawley : interesting fruits from Madeira.

The Grape Juice Co., 4 Farnival Street, E.C. : "Mostello Wine," a non-intoxicating beverage made from pure Grape juice.

FRUIT AND VEGETABLE COMMITTEE, APRIL 28, 1908.

Mr. BUNYARD, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended : —

Silver Knightian Medal.

To Lord Hillingdon, Hillingdon Court, Uxbridge (gr. Mr. Allan), for Strawberries.

To Messrs. J. Veitch, Chelsea, for a collection of Apples.

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for Salads grown on the French system.

Cultural Commendation.

To Mr. Cook, gr. to Sir E. Loder, Bart., Leonardslee, Horsham, for Seakale.

ORCHID COMMITTEE.

JANUARY 14, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for *Cypripediums*.

To Messrs. Heath, Cheltenham, for *Cypripediums*.

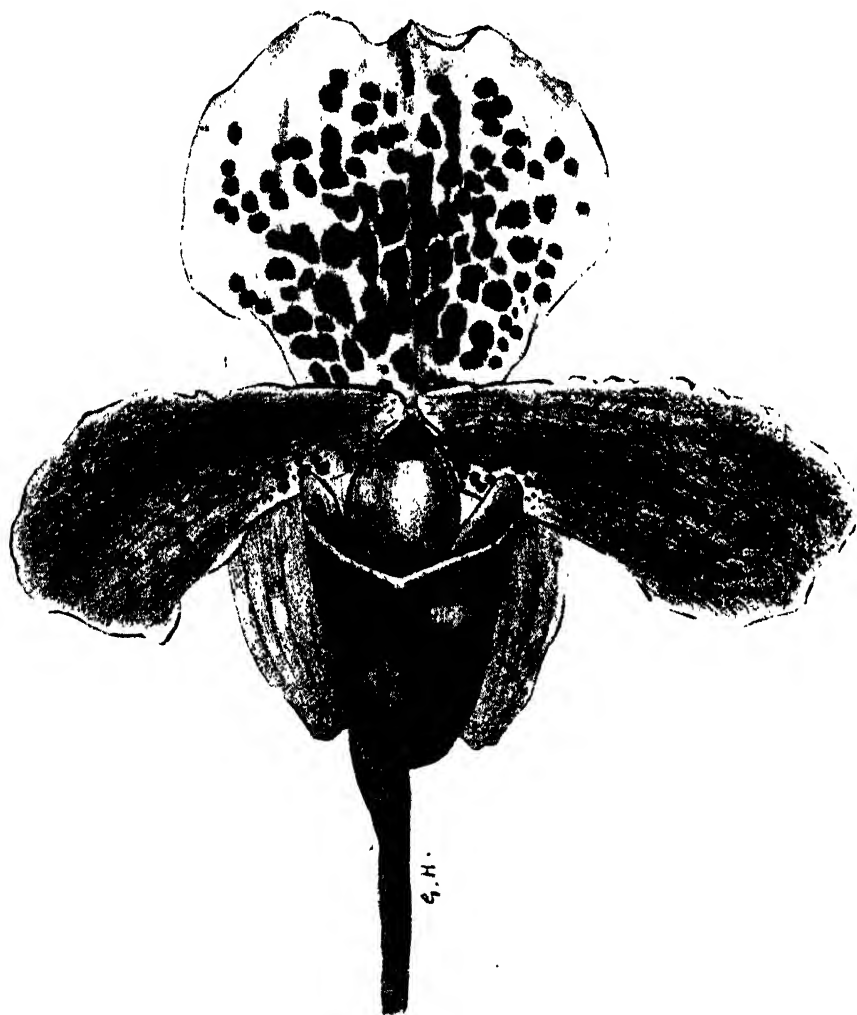


FIG. 16.—*CYPRIPEDIUM* 'SULTAN.' (*The Garden.*)

First-class Certificate.

To *Cypripedium* × 'Sultan' ('Mons. de Curte' × 'Milo' Westonbirt variety) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.V.O., C.I.E., Westonbirt, Tetbury (gr. Mr. H. G. Alexander). A large and broadly-proportioned flower. Dorsal sepal yellowish emerald-green, heavily blotched with dark purple, having a pure white margin half an inch in width. Petals and lip light mahogany red with yellow margin. (Fig. 16.)

To *Odontoglossum* × *MacNabianum* (*Harryanum* × *Wilckeanum albens*) (votes, unanimous), from Messrs. Sander, St. Albans. Flowers

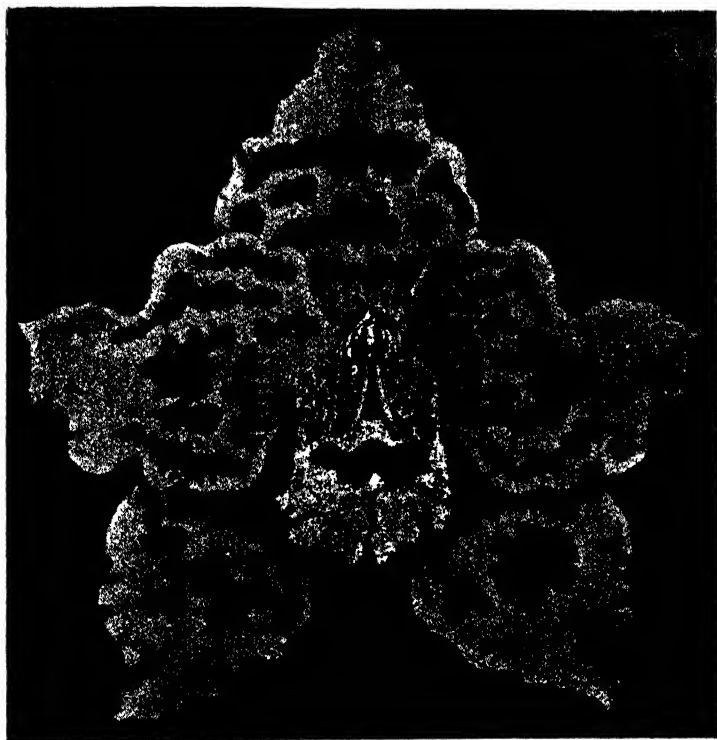


FIG. 17.—*ODONTOGLOSSUM* × *BINGELIANUM*. (*Journal of Horticulture*.)

having a distinct resemblance to those of *O. Harryanum*, but larger and flatter. Sepals and petals claret-red with a violet shade, the cream-white ground colour showing through in narrow transverse lines. Lip white, spotted with rose on the basal half.

To *Odontoglossum* × *Bingelianum* (parentage unrecorded) (votes, unanimous), from Baron Sir H. Schröder, V.M.H., The Dell, Egham (gr. Mr. Ballantine). A large broad-petalled flower of canary-yellow colour, the inner halves of the segments heavily blotched with light reddish-brown. Front of lip white. (Fig. 17.)

To *Cypripedium* × 'Minos,' Young's variety (*Spicerianum* × *Arthurianum*) (votes, unanimous), from Messrs. McBean, Cooksbridge. The fine

white dorsal sepal is tinted and veined with rose-purple from a small green base. Petals and lip yellowish, tinged with red-brown. (Fig. 18.)

Award of Merit.

To *Laelio-Cattleya* × 'Corunna' (parentage unrecorded) (votes, unanimous) from Lieut.-Col. G. L. Holford. Flowers bright magenta-rose



FIG. 18.—*CYPRIPEDIUM* 'MINOS,' YOUNG'S VARIETY. (*Gardeners' Chronicle*.)

with deep claret-coloured lip, having yellow lines at the base. Of the *L.-C. Ingramii* class.

Other Exhibits.

Sir Jeremiah Colman, Bart. (gr. Mr. W. P. Bound): a fine specimen of *Cypripedium* × 'G. F. Moore,' Gatton Park variety.

J. Bradshaw, Esq. (gr. Mr. Whitelegge): *Odontoglossum* × *venustum* var. 'Apollo.'

Mr. H. A. Tracy: *Cypripedium insigne* *Berryanum*.

Henry Little, Esq. (gr. Mr. Howard): an inflorescence of *Laelio-Cattleya* × *Callistoglossa ignescens* with five blooms.

Messrs. Armstrong & Brown, Tunbridge Wells: hybrid *Cypripediums*.

De B. Crawshay, Esq. (gr. Mr. Stables): *Odontoglossum* × *Waltoniense* var. (*Kegeljani* × *crispum* 'Raymond Crawshay').

Francis Wellesley, Esq. (gr. Mr. Hopkins): two hybrid *Cypripediums*.

Messrs. Charlesworth: the finely blotched *Odontoglossum crispum* 'Lyoth,' and several *Cypripediums*.'

ORCHID COMMITTEE, JANUARY 28, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth, Heaton, Bradford, for a group.

To Messrs. McBean, Cooksbridge, for white *Laelia anceps*, *Odontoglossums*, and scarlet *Epiphronitis* × *Veitchii*.

To Messrs. Jas. Cypher, Cheltenham, for *Cypripediums*.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group.

To F. Menteith Ogilvie, Esq., The Shrubbery, Oxford (gr. Mr. Balmforth), for *Cypripediums*.

Silver Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for *Cypripediums*.

To Messrs. Moore, Rawdon, Leeds, for *Cypripediums*, &c.

To Messrs. Hugh Low, Enfield, for a group.

To Messrs. Heath, Cheltenham, for a group.

Award of Merit.

To *Cypripedium Fairrieanum*, Cookson's variety (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman). A remarkable variety having the dorsal sepal claret colour, with a few blotches of the white ground colour at the base.

To *Cypripedium* × 'F. Sander' (votes, 12 for, 5 against), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A very pretty *Cypripedium*, the origin of which is obscure. The leaves have a fine dark green reticulation. The dorsal sepal is emerald green blotched with chocolate brown, the upper third being white with some purple spots; petals and lip yellow, tinged and veined with chocolate purple.

To *Cymbidium* × *gatonense* (*Lowianum* × *Tracyanum*) (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Reigate (gr. Mr. W. P. Bound). A very striking hybrid with flowers bearing a general resemblance to those of *C. giganteum*, but as large as those of

C. Tracyanum. Sepals and petals greenish-gold, striped with purplish-red; lip cream with red markings.

Other Exhibits.

Messrs. Linden, Brussels: hybrid *Odontoglossums* and *Cypripediums*.
Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. H. G. Alexander): hybrids.

Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins):
Cypripedium × 'Rajah' (*Io grande* × *Swinburnei magnificum*).

ORCHID COMMITTEE, FEBRUARY 11, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-seven members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegge), for white varieties of *Cattleya Trianaei*, varieties of *Lycaste Skinneri*, &c.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for *Cattleya Trianaei*, *Cypripediums*, &c.

To Messrs. Charlesworth, Bradford, for a group.

To Baron Sir H. Schröder, The Dell, Egham (gr. Mr. Ballantine), for plants of the rare *Odontoglossum coronarium brevifolium*, each with four or five spikes.

To Messrs. Jas. Cypher, for *Cypripediums*, &c.

Silver Banksian Medal.

To Messrs. Veitch, Chelsea, for hybrid *Cypripediums*.

To Messrs. Moore, Rawdon, for a group.

To Messrs. Stanley, for *Cattleya Trianaei*.

To Messrs. Heath, for hybrid *Cypripediums*.

To Messrs. Hugh Low, for a group.

Award of Merit.

To *Cymbidium* × 'Lady Colman' (*C. eburno-Lowianum* × *Tracyanum*) (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. W. P. Bound). A fine hybrid nearest to *C. Tracyanum*. Sepals and petals greenish sulphur-yellow, with fine dotted lines of purple. Lip white with distinct red markings.

To *Dia-Cattleya* × *Colmanae* (*Diacrium bicornutum* × *Cattleya intermedia nivea*) (votes, unanimous), from Sir Jeremiah Colman, Bart. A remarkable bigeneric hybrid resembling, in growth, and in the manner of producing its flowers, *Diacrium* (*Epidendrum*) *bicornutum*. Flowers 8 inches across, pure white. (Fig. 19.)

To *Lycaste Skinneri* 'Orion' (votes, unanimous), from J. Bradshaw, Esq. (gr. Mr. Whitelegge). Sepals blush-white; petals rose with white lines and tips; lip white.

Other Exhibits.

The Marquis de Wavrin, Ghent (gr. Mr. De Geeste) : *Cattleya Trianaei* 'Princess Elizabeth of Belgium.' A very fine white flower, tinged with lilac, and without the yellow disc usually seen on the lip in this species.

Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins) : *Cypripedium Gratrixiae giganteum* ; and *C.* 'William Mostyn' (*villosum* × 'Mons. de Curte'), both distinct varieties.

R. Brooman-White, Esq., Arddarccch, N.B. : spikes of *Odontoglossums*.

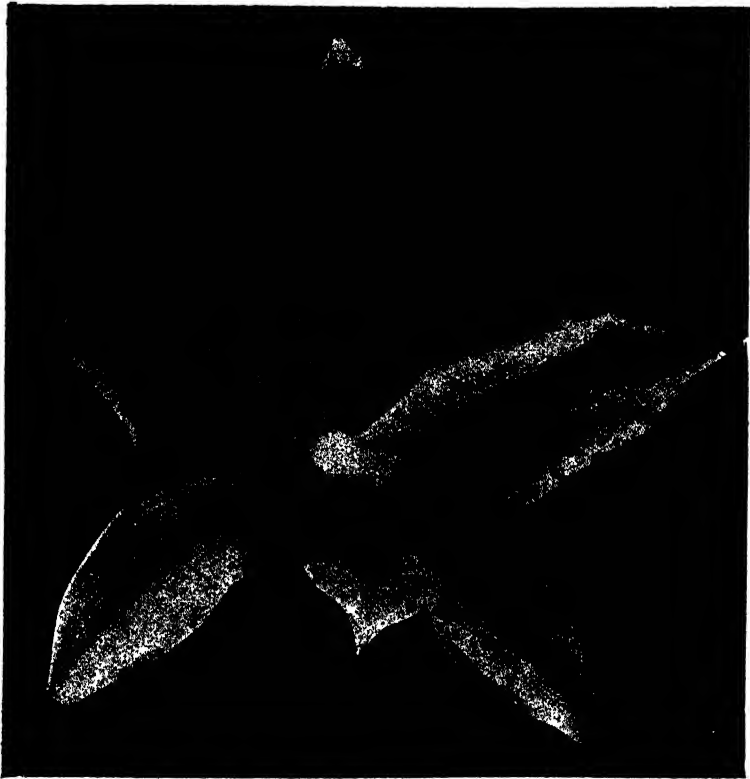


FIG. 19.—DIA-CATTELEYA COLMANAE. (*Gardeners' Chronicle*.)

Messrs. Armstrong & Brown : *Cattleya Trianaei* × *L.-C.* Phoebe.
Mons. Mertens, Ghent : hybrid *Odontoglossums*.

ORCHID COMMITTEE, MARCH 8, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-eight members present.

Awards Recommended :—*Gold Medal.*

To Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander), for a grand group of new hybrids, *Cattleya Trianaei*, &c.

To Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. W. P. Bound), for a very fine display of hybrid *Dendrobiums*, &c.

Silver-gilt Flora Medal.

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman), for a group containing several very finely blotched forms of *Odontoglossum crispum*.

Silver Flora Medal.

To Messrs. Jas. Cypher, Cheltenham, for *Cattleyas*, *Odontoglossums*, &c.

To C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), for a group.

To Messrs. Charlesworth, Heaton, Bradford, for a group.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid *Laelio-Cattleyas*, &c.

To Messrs. Hugh Low, Enfield, for *Cypripediums*, *Odontoglossums*, &c.

To Mons. Mertens, Ghent, for hybrid *Odontoglossums*.

First-class Certificate.

To *Cymbidium insigne (Sanderi) superbum* (votes, 19 for, 1 against), from Messrs. Sander. A very large variety with white flowers tinted with rose. Labellum spotted with deep rose-purple.

To *Cymbidium insigne splendens* (votes, 17 for, 6 against), from Messrs. Sander, St. Albans. Flowers tinged with rose, and having claret lines on the sepals and petals, and a mauve tint on the heavily spotted lip.

To *Dendrobium* × 'Cybele,' Gatton Park variety (*nobile nobilius* × *Findlayanum*) (votes, 18 for, 4 against), from Sir Jeremiah Colman, Bart. (gr. Mr. W. P. Bound). A large and finely formed flower, white with magenta-rose tips to the segments; the lip having a maroon and orange base. (Fig. 20.)

Award of Merit.

To *Dendrobium* × *chessingtonense*, Gatton Park variety (*aureum* × *Wiganiae*) (votes, 15 for, 4 against), from Sir Jeremiah Colman, Bart. Flowers yellow, with a dark base to the lip.

To *Maxillaria luteo-alba* (votes, unanimous), from Walter Cobb, Esq., Normanhurst, Rusper (gr. Mr. C. J. Salter). A fine old species with white and yellow flowers.

To *Brasso-Cattleya* × 'Helene Maron' (parentage unrecorded) (votes, 17 for, 1 against), from Mons. Chas. Maron, Brunoy, France. Probably a secondary hybrid of *B.-C. Digbyano-Mendelii*. Flowers white, shaded with lilac.

To *Laelio-Cattleya* × 'Pizarro' (*L. Jongheana* × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Col. G. L. Holford. Sepals and petals bright rose; lip orange shaded with purple.

To *Laelio-Cattleya* × 'Daffodil' (*L.-C.* × 'Mercia' (*L. flava* × *C. Schröderae*) × *L. Jongheana alba*) (votes, unanimous), from Messrs.

Armstrong & Brown, Tunbridge Wells. Flower white, with a yellow tint on the tips of the sepals and petals; lip yellow.

To *Sophro-Laelia* × 'Felicia' (*L. pumila praestans* × *S.-L. heatonensis*) (votes, unanimous), from Messrs. Charlesworth. Dwarf with bright purple flowers.

To *Odontoglossum* × 'Clytis' (*cirrhosum* × *Edwardii*) (votes, unanimous), from Messrs. Charlesworth. Flowers on branched spikes, rose-pink barred with claret-colour.

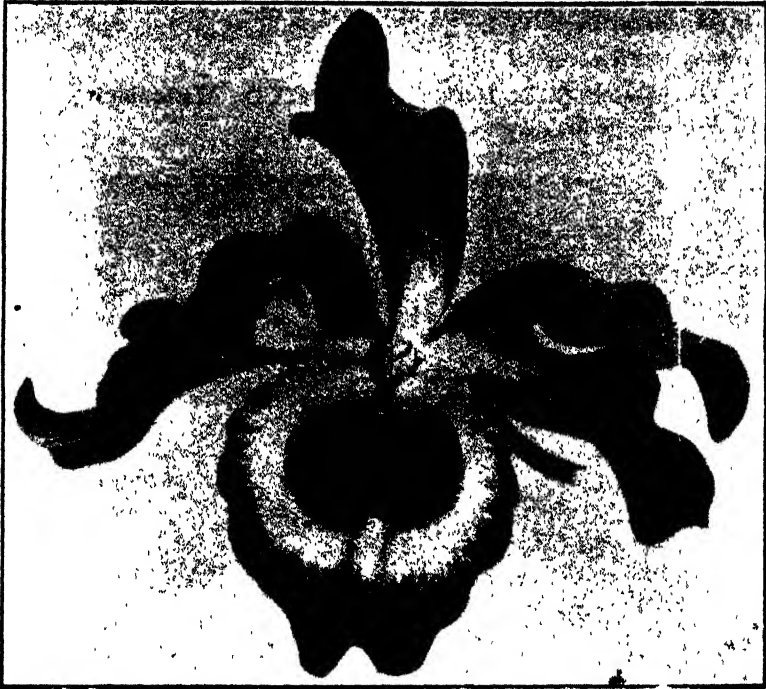


FIG. 20.—*DENDROBIUM* × 'CYBELE.' (*Journal of Horticulture*.)

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Col. G. L. Holford, for *Odontoglossum loochristiense* with four spikes bearing together fifty-six flowers.

To Mr. C. J. Salter, gr. to Walter Cobb, Esq., for *Maxillaria luteoalba* with about seventy blooms.

Other Exhibits.

Sir Trevor Lawrence, Bart., V.M.H., Burford (gr. Mr. W. H. White): fine forms of *Zygopetalum Ballii* and *Maxillaria variabilis unipunctata*.

J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge): *Cattleya Luddemanniana* var. 'Empress,' white with silvery veining.

H. J. Elwes, Esq., Colesborne: two forms of *Pleione yunnanensis*.

Francis Wellesley, Esq. (gr. Mr. Hopkins): *Cattleya* × *parisiensis* (*Dowiana aurea* × 'Parthenia').

C. L. N. Ingram, Esq. (gr. Mr. Bond): forms of *Laelio-Cattleya*
× *Dominiana*.
Messrs. Heath, Cheltenham : a group.

ORCHID COMMITTEE, MARCH 17, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three
members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr.
H. G. Alexander), for a group.



FIG. 21.—*VANDA SUAVIS PALLIDA*. (*Journal of Horticulture*.)

To J. Bradshaw, Esq., the Grange, Southgate (gr. Mr. G. G. White-
legge), for group, including many white varieties of *Cattleya Trianaci*.

Silver Flora Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a group.

To Messrs. J. Cypher, Cheltenham, for *Dendrobiums*, &c.

To Messrs. McBean, Cooksbridge, for varieties of *Odontoglossum*
crispum.

To Mr. A. W. Jensen, Lindfield, for *Cattleya Schröderae* and *Odonto-*
glossum crispum.

To Messrs. Hugh Low, Enfield, for a group.

Silver Banksian Medal.

To F. Menteith Ogilvie, Esq., The Shrubbery, Oxford (gr. Mr. Balmforth), for *Odontoglossums*.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Moore, Rawdon, Leeds, for a group.

First-class Certificate.

To *Vanda suavis pallida* (votes, unanimous), from Mons. T. Panwels, Ghent. A white variety, with pale green markings on the segments. (Fig. 21.)

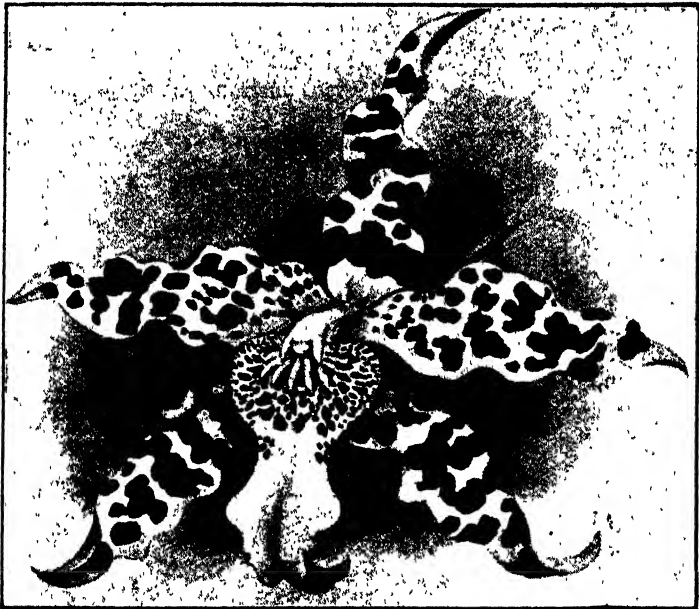


FIG. 22.—*ODONTOGLOSSUM* × 'GLADYS.' (*Journal of Horticulture*.)

To *Cattleya* × 'Suzanne Hye de Crom' (*Mossiae Wageneri* × *Gaskelliana alba*) (votes, unanimous), from Mons. Jules Hye de Crom, Ghent (gr. Mr. Coen). A pure white variety with yellow disc to the lip.

Award of Merit.

To *Cattleya* × 'Enid,' Westonbirt variety (*Warscewiczii* × *Mossiae*) (votes, unanimous), from Lieut.-Col. G. L. Holford (gr. Mr. Alexander). A fine form with rose-tinted sepals and petals, and ruby-crimson lip.

To *Laelio-Cattleya* × *luminosa*, Westonbirt variety (*L. tenebrosa* × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.V.O., C.I.E. Sepals and petals Indian yellow tinged with red; lip claret-crimson.

To *Odontoglossum* × 'Gladys' (*cirrhosum* × *Harryanum*) (votes, unanimous), from Messrs. Charlesworth. Flowers with narrow segments, resembling *O. × elegans*; greenish-white spotted with purple. (Fig. 22.)

To *Laelio-Cattleya* × 'Elinor' (*L.* × 'Coronet' × *C. Schröderae*) (votes, unanimous), from Messrs. Charlesworth. Flowers deep orange as in *L.* × 'Coronet' (*harpophylla* × *cinnabarina*), but much larger.

Botanical Certificate.

To *Coelogyne* (*Pleione*) *pogonioides*, from Messrs. Jas. Veitch. A dwarf species from China. Flowers rosy-lilac.

To *Dendrobium fusiforme*, from Messrs. Moore, Rawdon, Leeds. An Australian species with many-flowered racemes of cream-white flowers, with purple lines on the lip.

Cultural Commendation.

To Mr. Alexander, Orchid grower to Lieut.-Col. G. L. Holford, for a fine specimen of *Odontoglossum* × *Adrianae* 'Lady Wantage,' bearing a thirteen-branched inflorescence of about one hundred flowers.

To Mr. Alexander for *Cattleya* × 'Enid,' Westonbirt variety, with six flowers on a spike.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., V.M.H., for *Brasso-Cattleya* × *Lindleyana* with over fifty flowers.

Other Exhibits.

Sir Jeremiah Colman, Bart. (gr. Mr. W. P. Bound): *Dendrobiums*.

De B. Crawshay, Esq. (gr. Mr. Stables): three new hybrid *Odontoglossums*.

Messrs. Charlesworth: a group.

Messrs. Heath: a group.

Mons. Mertens: a group.

ORCHID COMMITTEE, MARCH 31, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Silver Banksian Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day), for a group.

To Mr. A. W. Jensen, Lindfield, Sussex, for *Cattleya Schröderae*.

First-class Certificate.

To *Cypripedium* × 'Helen II.,' Westonbirt variety (*insigne*, 'Harefield Hall' × *bellatulum*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt. Flower large and bearing distinct traces of *C. insigne* 'Harefield Hall'; cream-white, heavily blotched with rose-purple. (Fig. 23.)

To *Phaius* × 'Clive' ('Norman' × *tuberculosis*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). A very fine form of the hybrid which received an Award of Merit February 24, 1908. Sepals and petals pale lilac with a central yellowish band. Lip claret colour at the base, the front rose, blotched with purple.

Award of Merit.

To *Odontoglossum* × *percultum* 'J. R. Roberts' (*Rolfeae* × *ardentissimum*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A pleasing flower, blush-pink with white margined segments, the middles of which are densely spotted with rose-purple.

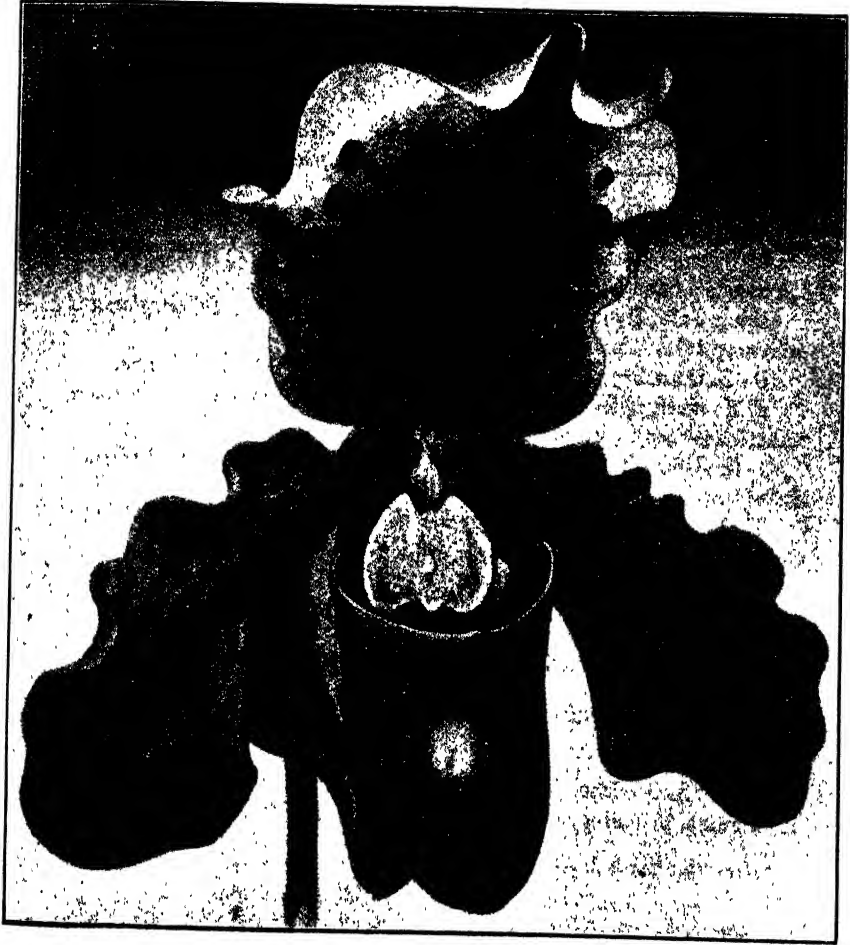


FIG. 23.—*CYPRIPEDIUM* × 'HELEN II.,' WESTONBIRT VARIETY.
(*Journal of Horticulture.*)

To *Dendrobium* × *Thwaitesiae*, Bound's variety (*Ainsworthii splendissimum* × *Wiganiae*) (votes, 10 for, 1 against), from Sir Jeremiah Colman, Bart., Gatton Park (gr. Mr. Bound). Flowers yellowish-buff with purple disc to the lip.

To *Cattleya Schröderae* 'Queen Alexandra' (votes, unanimous), from Messrs. Sander, St. Albans. Flower large; sepals and petals bluish-white; disc of the lip orange with a purple band in front.

To *Cypripedium* × *Berkeleyanum* (*Boxallii* × *bellatulum*) (votes, unanimous), from J. Forster Alcock, Esq., Northchurch, Berkhamsted. Flowers almost entirely claret-purple colour, the cream-white ground colour appearing slightly between the blotches.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Col. G. L. Holford, for *Ada aurantiaca* with fifty-one spikes.

To Mr. H. Tysoe, gr. to Miss Fitzpatrick, Bedford, for *Cyrtopodium punctatum* with five spikes.

Other Exhibits.

J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis): *Cymbidium* × 'J. Gurney Fowler,' and two hybrid *Odontoglossums*.

Messrs. Charlesworth: a group.

J. Wilson Potter, Esq. (gr. Mr. Young): *Odontoglossum crispum* 'Rossendale,' and *O. c.* 'Empress of India.'

Mons. Jules Hye de Crom (gr. Mr. Coene): seedling *Odontoglossum crispum* 'Jules Coene,' a blotched variety.

De B. Crawshay, Esq. (gr. Mr. Stables): hybrid *Odontoglossums*.

F. Menteith Ogilvie, Esq. (gr. Mr. Balmforth): *Odontoglossum crispum* 'Alexandrovitch,' a purple-blotched form.

J. Bradshaw, Esq. (gr. Mr. Whitelegge): two fine forms of *Cattleya Schröderae*.

W. James, Esq., Chichester (gr. Mr. Smith): good varieties of *Cattleya Schröderae*.

ORCHID COMMITTEE, APRIL 14, 1908.

MR. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, West Hill, Putney (gr. Mr. Day), for a group, including some good hybrid *Odontoglossums*.

Silver Banksian Medal.

To Messrs. Jas. Veitch, Chelsea, for *Odontoglossums* and *Cattleya Schröderae*.

To Mr. A. W. Jensen, Lindfield, Sussex, for varieties of *Odontoglossum crispum* and *Cattleya Mendelii*.

To Messrs. McBean, Cooksbridge, for *Odontoglossums*.

To Messrs. Hugh Low, Enfield, for a group.

To Messrs. J. Cypher, for a group.

First-class Certificate.

To *Cattleya Schröderae* 'The Baron' (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander). A remarkable variety with white flowers, the disc of the lip having a peculiar blending of orange, rose, and violet. (Fig. 24).

To *Cypripedium bellatulum*, 'Exhims variety' (votes, unanimous), from J. Forster Alcock, Esq., Exhims, Northchurch. The finest dark form of *C. bellatulum*, the surface of the flower being almost covered with blackish-chocolate blotches.

Award of Merit.

To *Dendrobium Brymerianum*, Gatton Park variety (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Reigate (gr. Mr. W. P.

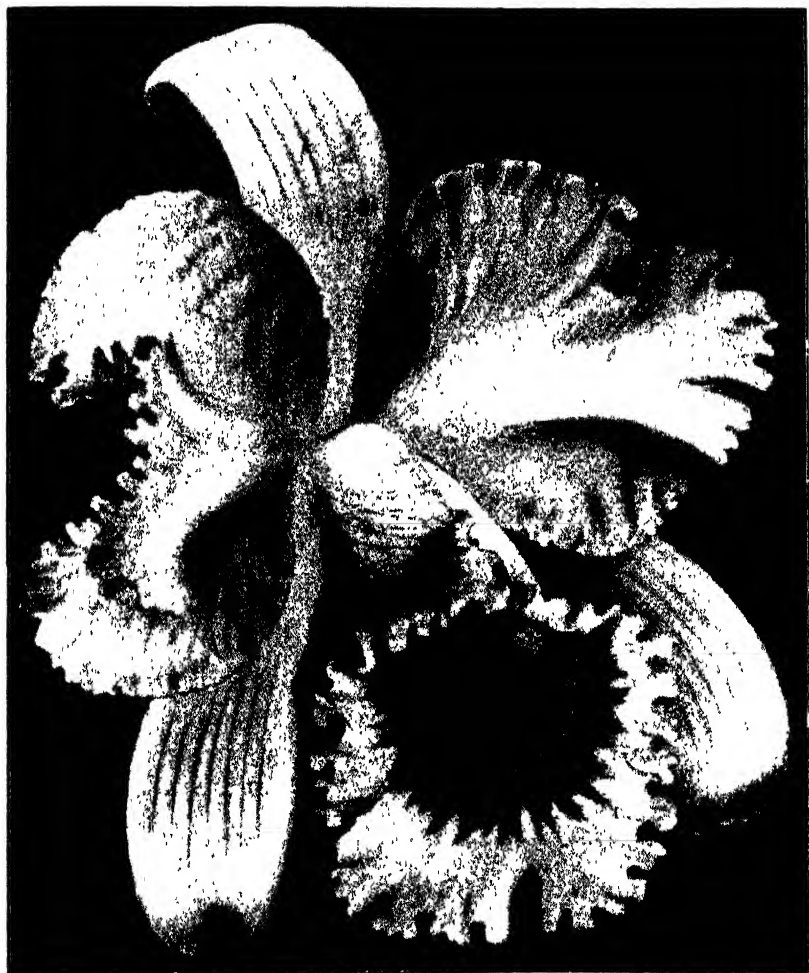


FIG. 24.—*CATTELEYA SCHRÖDERAE* 'THE BARON.' (*Journal of Horticulture*.)

Bund). Flower 4 inches in length and $2\frac{1}{2}$ inches across the finely fringed lip, the whole being bright yellow.

To *Cymbidium eburneum Goodsonianum* (votes, unanimous), from H. S. Goodson, Esq., Putney (gr. Mr. Day). Flowers white, with a broad rose-purple band down the middle of the labellum.

Cultural Commendation.

To Mr. W. H. White, Orchid grower to Sir Trevor Lawrence, Bart., V.M.H., for a grand specimen of *Dendrobium fimbriatum oculatum* with forty spikes of flowers.

To Mr. J. Davis (gr. to J. Gurney Fowler, Esq.), for *Masdevallia Schröderiana* with fifty-one flowers.

Other Exhibits.

MESSRS. SANDER : *Cypripedium* × 'Black Watch' ('W. R. Lee' × *Curtisii*).

R.H.S. Gardens, Wisley : the rare *Cymbidium chloranthum*.

De B. Crawshay, Esq. (gr. Mr. Stables) : three forms of *Odontoglossum* 'Urania' (*crispum* × *cristatellum*).

ORCHID COMMITTEE, APRIL 28, 1908.

MR. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended :—

Silver Flora Medal.

To J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis), for large specimens of *Oncidium Marshallianum*, the largest bearing four strong flower-spikes.

To Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), for *Laelia-Cattleya*, &c.

Silver Banksian Medal.

To Messrs. Jas. Cypher, for *Miltonia vexillaria*, &c.

To Messrs. Armstrong & Brown, for a group.

To Messrs. Hugh Low, for *Dendrobiums*, &c.

To Messrs. Heath, for a group.

First-class Certificate.

To *Odontoglossum crispum* 'Queen of the Earth' (votes, 13 for, 3 against), from De B. Crawshay, Esq., Rosetield, Sevenoaks (gr. Mr. Stables). A showy flower, heavily blotched with reddish-claret colour. Probably a garden seedling.

Award of Merit.

To *Odontoglossum platycheilum superbum* (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (gr. Mr. W. H. White). A pretty Guatemalan species, of which a solitary specimen appeared and received an Award of Merit, March 22, 1892. That example had white flowers spotted with rose on the lip. The present form bore seven spikes, generally two-flowered, pink with rose-spotted lip.

To *Aerides Vandarum* (votes, 7 for, 2 against), from Mrs. Bevington, Sevenoaks (gr. Mr. Huxley). The well-known terete-leaved species, with bluish-white flowers.

To *Cirrhopetalum Wendlandianum* (votes, unanimous), from Sir Trevor Lawrence, Bart., V.M.H. An ally of *C. Collettii*, with flowers in a

one-sided umbel, each 5 inches in length, yellow, striped and tinged with red. Upper sepal and petals fringed.

To *Odontoglossum naevium* (votes, unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. An elegant old species with branched spikes of white flowers spotted with red.

Botanical Certificate.

To *Cirrhopetalum Roxburghii*, from Sir Trevor Lawrence, Bart. A dwarf highland Indian plant with slender spikes of cream-white flowers tinged with rose, and arranged in an almost globular head.

Cultural Commendation.

To Mr. J. Davis (gr. to J. Gurney Fowler, Esq.), for splendidly flowered *Oncidium Marshallianum*.

Other Exhibits.

R. G. Thwaites, Esq., Chessington, Streatham (gr. Mr. Black): two plants of the pure white *Cattleya Dusseldorfei* 'Undine,' Chessington variety, and the showy *Laelio-Cattleya* × *Wellsiana*, Chessington variety.

F. Menteith Ogilvie, Esq. (gr. Mr. Balmforth): *Cypripedium Lawrenceanum* 'Marjorie.'

H. D. Headland, Esq., Balham: varieties of *Cattleya Mendelii*.

L. C. Ravens, Esq., Odense, Denmark: three varieties of *Cattleya Schroderae*.

NARCISSUS AND TULIP COMMITTEE.

MARCH 17, 1908.

Mr. H. B. MAY in the Chair, and sixteen members present.

The season being a late one there were no flowers submitted for Certificate.

Award Recommended:—

Silver Banksian Medal.

To Messrs. Barr, King Street, Covent Garden, for Daffodils opened under glass.

NARCISSUS AND TULIP COMMITTEE, MARCH 31, 1908.

Mr. H. B. MAY in the Chair, and twenty-five members present.

On the motion of the Rev. J. Jacob, seconded by Mr. P. R. Barr, the following recommendation to the Council was unanimously agreed upon: "That this Committee respectfully requests the Council to arrange, on an early Tuesday in the year, a show which shall be especially devoted to forced Daffodils and Tulips, as they consider this branch of floriculture has a wide interest."

The first week in March was suggested as a suitable time for such an exhibition, as the Committee desired to see gentle forcing, rather than hard forcing, encouraged.

The Council subsequently agreed to issue invitations welcoming exhibits of forced bulbs for the last meeting in February or the early one in March; and, though they could not grant the exclusive use of the Hall for such a display, the Council hoped sufficient prominence would be thus given to forced bulbs to meet all reasonable requirements.

Award Recommended:—

Silver Banksian Medal.

To Messrs. Cartwright & Goodwin, Blakebrook, Kidderminster, for early Daffodils, including a few new varieties, notably 'Mervyn,' which the Committee expressed a wish to see again when grown out of doors.

Other Exhibits.

Chas. Dawson, Esq., Rosemorran, Gulval, Penzance: group of new Daffodils.

Messrs. R. H. Bath, Wisbech: Daffodils and Tulips.

Miss F. W. Currey, Warren Gardens, Lismore, Ireland: Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 14, 1908.

Mr. H. B. MAY in the Chair, and twenty-eight members present.

Awards Recommended :—

Gold Medal.

To Charles Dawson, Esq., Rosemorran, Gulval, Penzance, for a large collection of finely grown new and rare Daffodils, many of them unnamed seedlings of high merit.



FIG. 25.—NARCISSUS 'BUTTERCUP.'

Silver-gilt Flora Medal.

To Miss F. W. Currey, Warren Gardens, Lismore, Ireland, for Daffodils.

Silver-gilt Banksian Medal.

To Sir Josslyn Gore-Booth, Bart., Lissadel, Sligo, for Daffodils.

To Messrs. Cartwright & Goodwin, Blakebrook, Kidderminster, for choice Daffodils.

Silver Flora Medal.

To Messrs. Hogg & Robertson, Mary Street, Dublin, for a large group of Daffodils.

To Messrs. Barr, King Street, Covent Garden, for Daffodils, including a number of new seedlings.

Award of Merit.

To Narcissus 'Buttercup' (votes, unanimous), from Chas. Dawson, Esq., Rosemorran, Gulval, Penzance. A beautiful deep golden-yellow, sweetly scented variety, with ample perianth segments and a shapely trumpet, a result of crossing Narcissus 'Emperor' with the Campenelle Jonquil. (Fig. 25.)

Other Exhibits.

Messrs. R. H. Bath, Wisbech : a small group of Daffodils.

Messrs. James Carter, High Holborn : about a hundred blooms of Narcissus 'King Alfred.'

Messrs. J. Pope, King's Norton, Birmingham : Daffodils.

Messrs. R. & G. Cuthbert, Southgate : a small group of forced Tulips.

Mr. F. H. Chapman, Guldeford Lodge, Bye : a small group of the newer Daffodils.

Messrs. William Bull, King's Road, Chelsea : Daffodils.

Mr. Robt. Sydenham, Tenby Street, Birmingham : Daffodils and Tulips grown in undrained pots in a mixture of crushed shell and moss fibre.

Barr Cup Competition.

Owing to the backwardness of the season there was but one entry for the Barr Cup offered for a collection of Daffodils ; and as the Judges did not consider the exhibit worthy of the award the prize was withheld.

NARCISSUS AND TULIP COMMITTEE, APRIL 28, 1908.

Mr. H. B. MAY in the Chair, and twenty-four members present.

On the motion of the Rev. J. Jacob, seconded by Mr. J. Pope, it was unanimously resolved to recommend the Council to appoint a sub-committee to frame a classification of Daffodils for show and catalogue purposes, as it was felt that the old divisions of large, medium, and small crowned varieties were now insufficient.

This recommendation was very favourably received by the Council, and the Rev. W. Wilks, Rev. G. Engleheart, Rev. J. Jacob, and Messrs. J. T. Bennett-Poe, J. W. Barr, E. A. Bowles, and C. H. Curtis were appointed to act as a Classification Sub-Committee.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Barr, King Street, Covent Garden, for choice Daffodils, including the new varieties 'Furnace,' 'Catriona,' 'Buttercup,' 'Royalist,' 'Blazing Star,' 'Iris,' 'Honeydrop,' and 'Radiant.'

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils, including 'Weardale Perfection,' 'White Lady,' 'Madame de Graaff,' 'Lady Margaret Boscawen,' &c.

To Messrs. Cartwright & Goodwin, Blakebrook, Kidderminster, for Daffodils, including 'Nymph,' 'Seagull,' 'Mrs. Robt. Sydenham,' 'White Slave,' 'Juliet,' 'Circlet,' and 'Armeline.'

Silver Flora Medal.

To Messrs. J. Pope, King's Norton, Birmingham, for Daffodils, including many raised by the firm.

Silver Banksian Medal.

To Messrs. R. Wallace, Colchester, for Daffodils and Tulips.

To Messrs. Cuthbert, Southgate, for bedding and 'Darwin' Tulips.

Other Exhibits.

Mr. Robt. Sydenham, Tenby Street, Birmingham: bulbous plants grown in moss fibre.

Messrs. William Bull, King's Road, Chelsea: Daffodils.

Messrs. James Veitch, King's Road, Chelsea: Daffodils.

NARCISSUS AND TULIP COMMITTEE, MAY 12, 1908.

Mr. H. B. MAY in the Chair, and nineteen members present.

Awards Recommended:—*Silver Flora Medal.*

To Mr. Alex. M. Wilson, East Keal, Spilsby, for a group of the newer Daffodils, including 'Will Scarlett,' 'White Slave,' 'Lucifer,' 'Blood Orange,' 'Eoster,' 'Homespun,' 'Horace,' and 'Gleam.'

To Messrs. Barr, King Street, Covent Garden, for Daffodils and Tulips.

To Messrs. R. H. Bath, Wisbech, for a group of handsome Tulips and a few Daffodils.

To Messrs. R. Wallace, Colchester, for a large group of Tulips, including 'Pride of Haarlem,' 'Fra Angelico,' 'Feu Ardent,' 'Flame,' 'Glow,' and 'Circe.'

Bronze Flora Medal.

To Miss Katherine A. Spurrell, Bessingham, Norwich, for a small group of seedling Daffodils, mostly not yet named.

Award of Merit.

To Narcissus 'Snow Shoe' (votes, 11 for, 4 against), from Messrs. Walter T. Ware, Inglescombe, Bath. A large-flowered *poeticus* variety,

with substantial, pure-white, slightly recurving perianth segments and a deep red crimson-rimmed cup.

Other Exhibits.

Mr. F. H. Chapman, Guldeford Lodge, Rye : a few late Daffodils.

Messrs. James Veitch, King's Road, Chelsea : Tulips.

Mrs. A. H. Benson, 16 South Street, Park Lane, W. : unusually large blooms of ' Darwin ' Tulips.

ESTABLISHED
1804.



INCORPORATED
1809.

TELEGRAMS:
"HORTENSIA, LONDON."

TELEPHONE:
5363 WESTMINSTER.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

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| 1. Notice to Fellows. | 19. Conference on Spraying. |
| 2. Letters. | 20. Bottled Fruits Show. |
| 3. Telephone and Telegrams. | 21. Colonial-grown Fruit Shows. |
| 4. Journals Wanted. | 22. Shows of kindred Societies. |
| 5. Subscriptions. | 23. Forced Bulb Show. |
| 6. Form of Request. | 24. Special Prizes. |
| 7. Privileges of Chemical Analysis. | 25. Lectures. |
| 8. List of Fellows. | 26. Examinations |
| 9. New Fellows. | 27. Information. |
| 10. An Appeal. | 28. Inspection of Fellows' Gardens. |
| 11. The Society's Gardens at Wisley. | 29. Affiliated Societies. |
| 12. The Wisley Research Station. | 30. Union of Horticultural Mutual Improvement Societies. |
| 13. Students at Wisley. | 31. Classification of Daffodils |
| 14. Distribution of Surplus Plants. | 32. Colour Chart. |
| 15. The Society's Hall and Offices. | 33. Monograph on Fungoid Pests. |
| 16. Letting of Hall. | 34. Rules for Judging. |
| 17. Exhibitions, Meetings, and Lectures in 1908. | 35. Varieties of Fruits. |
| 18. British-grown Fruit Show. | 36. Advertisements. |

1. NOTICE TO FELLOWS.

A few pages of Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on all subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number : **WESTMINSTER, 5363.**

" HORTENSIA, LONDON," is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be very greatly obliged for any of the following back numbers :—Vol. V., Part 1 ; Vol. VII., Part 2 ; Vol. X. ; Vol. XIII., Part 1 ; Vol. XVI., Parts 2 and 3 ; Vol. XVII., Parts 1 and 2 ; Vol. XVII., Parts 3 and 4 ; Vol. XIX., Part 1 ; Vol. XIX., Part 2 ; Vol. XX., Part 3 ; Vol. XXII., Part 3 ; Vol. XXII., Part 4 ; Vol. XXV., Part 3 ; Vol. XXVI., Part 4 ; Vol. XXVII., Part 1 ; Vol. XXVII., Part 4 ; Vol. XXVIII., Parts 3 and 4 ; and Vol. XXIX., Parts 1, 2, and 3. Also the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use or interest to Fellows would be appreciated, as applications for back numbers are repeatedly received.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellow, owing to the very large numbers, nearly 20,000, having to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Forms for the purpose may be obtained from the R.H.S. Offices at Vincent Square, Westminster, S.W. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London and County Bank, Westminster."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ , to be paid out of such part of my personal estate as I can lawfully charge with the payment

of such legacy, and to be paid free of legacy duty, within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 70 in the "Book of Arrangements," 1908. (See p. xc.)

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the addresses insufficient, they are requested to inform the Secretary at once. Another use which all Fellows might make of this list is to consult it with reference to their friends' names, and if any of them are not found recorded therein they might endeavour to enlist their sympathies with the Society, and obtain their consent to propose them as Fellows forthwith. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL and the "Book of Arrangements."

9. NEW FELLOWS.

On March 6 last the Society completed its 104th year. Will all the Fellows do their best to extend the usefulness of the Society by enlisting the sympathy of all their friends and persuading them to join the ranks of the Society? A list of the privileges of Fellows will be found at page 16 in the "Book of Arrangements," and just a line addressed to the Secretary R.H.S., Vincent Square, Westminster, containing the name and address of the proposed new Fellow will suffice. Should it be preferred, the Secretary will, upon receipt of a postcard or letter giving the name and address of any persons likely to join the Society, write direct and invite them to allow their names to be proposed for election.

10. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially in:—

1. Increasing the number of Fellows.

2. Helping to swell the Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

3. Lectures with lantern slides.

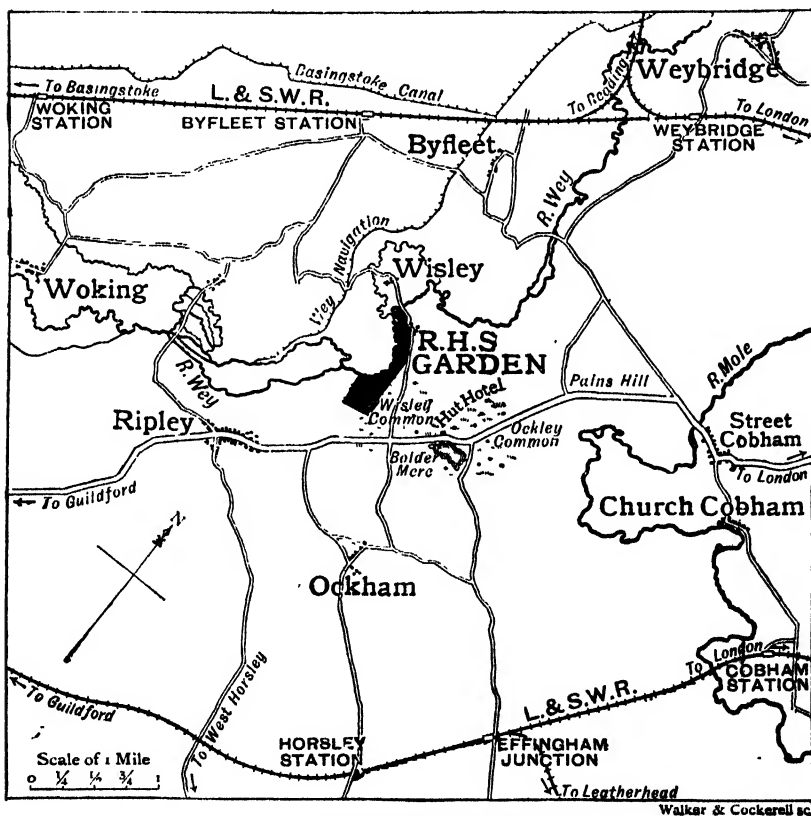
4. Books are required to fill the gaps in the Library both at Vincent Square and at Wisley.

5. New and rare Plants are wanted for the Garden and surplus roots for distribution to the Fellows.

• Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the ways above indicated.

11. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets from 9 A.M. till sunset, except on Sundays, Good Friday, and Christmas Day. Each Fellow's ticket admits three to the Gardens. The Public are not admitted. There is much of interest to



POSITION OF THE SOCIETY'S GARDENS.

be seen at Wisley throughout the year. The late Mr. G. F. Wilson's garden included a wild wood-garden, a bank of flowering shrubs, a series of ponds and pools, and a fine collection of Japanese Iris, Primulas, Lilies, Rhododendrons, &c. The Society has added a fine collection of

the best varieties of fruit trees, of bamboos, of roses, and of ornamental trees and flowering shrubs, for the most part kindly given by the leading nurserymen. A very large sum of money has also been spent in the erection of a first-rate Meteorological Station, and a fine series of glass-houses; a dwelling-house for the Superintendent; a Cottage for the Fruit Foreman; and in establishing a complete system of water supply; on drainage works, and on road-making.

The Gardens are situated at Wisley, about 2 miles from Ripley in Surrey, and about $3\frac{1}{2}$ miles from Horsley and $5\frac{1}{2}$ miles from Weybridge, both stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.; Effingham Junction, 7s.; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr. Trombling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

12. THE WISLEY RESEARCH STATION.

The new Research Station and Laboratory at Wisley is now completed and work is in progress there. Mr. F. J. Chittenden has been appointed Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students. By the completion of this station a long-felt want has been met. In the United States, where so much good work has been done in this direction, all is paid for by the Government, but in this country we have to fall back on private individuals or on Societies.

13. STUDENTS AT WISLEY.

The Society admits a limited number of young men, not exceeding 22 years of age, to study Gardening at Wisley, where the training has been recently further developed by the erection of the Laboratory and Research Station. The curriculum now includes not only practical garden work in all the main branches of Horticulture, but also lectures, demonstrations, and elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c., may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can only enter at the end of September and at the end of March. Selected Students have also the advantage of attending certain of the Society's Shows and Lectures in London. It is generally easy to find these young men employment on the completion of their training; in fact, the Council are quite unable to meet the demands for energetic, trustworthy young men; but they *must all be workers*.

14. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution was established. The great majority also are of necessity *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive all the plants exactly as he has selected, but when the Ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganised by the sending-out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

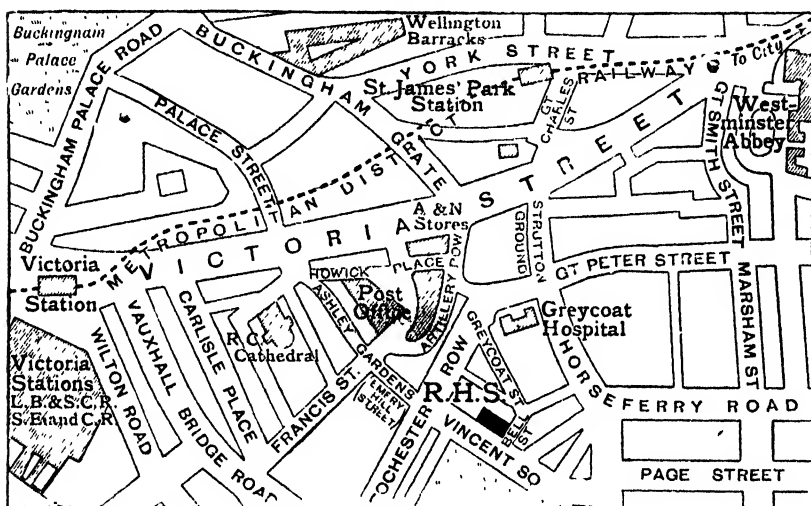
The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

15. THE SOCIETY'S HALL AND OFFICES.

The Royal Horticultural Hall and Offices are situated in Vincent Square, which lies straight through Ashley Gardens from Victoria Street,



POSITION OF THE SOCIETY'S HALL.

Westminster, and is about five minutes' walk from the Victoria and St. James's Park Stations.

16. LETTING OF HALL.

Fellows are earnestly requested to make known among their friends and among institutions that the ROYAL HORTICULTURAL HALL is available, twelve days in each fortnight, for Meetings, Shows, Exhibitions, Concerts, Conferences, Lectures, Balls, Banquets, Bazaars, Receptions, and other similar purposes. The Hall has a floor surface of 18,000 square feet. It is cool in summer and warm in winter. For a Concert it will seat 1,500, or for a public meeting 1,800. It is undoubtedly the lightest Hall in London, and its acoustic properties are pronounced excellent by some of our greatest authorities. The charges, which are very moderate, include lighting, warming in winter or cooling the air in summer, seating, and the use of trestle-tabling and platform. The first floor, consisting of four fine rooms, may also be hired for similar purposes, either together with or separately from the Great Hall. This

accommodation can also be divided up if desired. A long-felt want has now been met by the construction of a convenient kitchen in the basement, with lift connections to the eastern annexe and lecture room. For serving luncheons, &c., this will prove a great boon. Ample cloak-rooms for ladies and for gentlemen are available. In fact, the Hall is not only the most suitable Hall in London for special Shows of a high-class character, but it is also second only to the Queen's Hall and the Royal Albert Hall for the purposes of Concerts and Meetings. Reduction is made to Charities, and there are special terms for Societies kindred or allied to Horticulture. The regulations, &c., for hiring the Hall are printed in the "Book of Arrangements," and full particulars may be obtained on application to the Secretary R.H.S., Vincent Square, Westminster, S.W., with whom dates may be booked.

17. EXHIBITIONS, MEETINGS, AND LECTURES IN 1908.

A full programme for 1908 will be found at pages 41 to 63 in the "Book of Arrangements" for 1908. It will be noticed that an Exhibition and Meeting is held in the Royal Horticultural Hall practically every fortnight throughout the year, and a short lecture on some interesting subject connected with Horticulture is delivered during the afternoon. Special Shows have also been arranged on days other than those of the Society's own Exhibitions. See page lxxxii.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (38) of halfpenny cards *ready addressed* to himself.

18. BRITISH-GROWN FRUIT SHOW, 1908.

The Great Autumn Show of British-grown Hardy Fruits, which the Society has held for so many years past, has become as much a thing to be regularly looked for by fruit-growers as the Show at the Temple in May is looked for by growers of flowers.

The fifteenth of these Shows will be held on October 15 and 16, 1908, in the Society's Hall.

19. CONFERENCE ON THE SPRAYING OF FRUIT TREES.

With the hearty concurrence of the National Fruit Growers' Federation the Society is organising a Conference on SPRAYING on the second day of their Annual Exhibition of British-grown Fruit, at their Hall in Vincent Square, Westminster. The Conference will be warmly welcomed by fruit-growers as a means of obtaining and disseminating

the latest expert information on this very practical subject. The following is the programme proposed :—

OCTOBER 16, 1908.

11 A.M. to 1.0 P.M.,
COLONEL WARDE, M.P., in the Chair.

Papers by

MR. GEO. MASSEE, V.M.H.,

AND

MR. H. F. GETTING, F.R.H.S.

Discussion invited.

2.30 P.M. to 4.30 P.M.
COLONEL LONG, M.P., in the Chair.

Papers by

PROFESSOR F. V. THEOBALD, M.A.,

AND

MR. G. HAMMOND, F.R.H.S.

Discussion invited.

W. WILKS, *Sec. R.H.S.*

Seats will be reserved for any making application BEFORE October 9.

20. BOTTLED BRITISH FRUITS, &c., SHOW.

The Annual Exhibition of British Bottled Fruits will be held on November 26 and 27, 1908, when it is hoped to see a still larger number of exhibits than last year. This is an Exhibition which should prove particularly attractive in domestic circles. Money Prizes and Medals are offered, and this year a new Class (No. 29 in the Schedule) has been added for bottled fruits to be shown in November 1908, and retained by the Society for a corresponding Show in 1909, when they will be tested by the Judges. The first prize is a Silver Cup. See "Book of Arrangements," page 68.

21. COLONIAL-GROWN FRUIT SHOW, 1908.

The President and Council of the Royal Horticultural Society will hold an Exhibition of Colonial-grown Fruits and Vegetables on November 26 and 27.

In fixing this date the object aimed at is to suit the season which is most likely to find the produce of Canada, British Columbia, and the West Indies in the greatest perfection in London. Opportunity is afforded for each Colony to make Collective Exhibits in addition to the exhibits of individual growers or firms. These Exhibitions were originally organized in 1904, and have been the means of bringing before the British Fruit Merchants and fruit-consuming public the wonderful resources of the Fruit Markets of Great Britain quite independently of the foreigner. The Society's sole object is the advancement of the interest of the Colonies (a) by stimulating the production of better fruits; (b) by giving advice and assistance in the difficulties ever confronting Fruit Growers; and (c) by helping to inform the home market. The results have been encouraging; for even in so short a time as the last three years a distinctly better quality of fruit has been sent, those recently shown being of an improved appearance, less blotched by fungus, scale and other

defects, and better packed. At the same time the Council are disappointed at the backwardness of Exhibitors and the smallness of their exhibits. Fruit Growers in the Colonies are therefore asked to assist their own future competition in the market by sending exhibits to these Exhibitions, invitations to which will be given to the Colonial and Government Offices, the Embassies, the leading London Fruit Merchants, Colonials on furlough, and many others.

The Agents-General and other authorities are most kindly rendering every assistance, and we trust that both growers and shippers will do their best to send in Exhibits worthy of our Colonies, and to show what can be produced for the Home markets. No entrance fee or charge for space is made, and Tabling is also provided free of expense.

If desired any produce may be consigned direct to the Society and it will be stored in the cellars at Vincent Square and staged by the Society's officials; but the Society cannot undertake to repack and return any exhibits.

Particulars of the Shows can be obtained from the Secretary R.H.S., Vincent Square, Westminster, S.W., by enclosing one penny stamp in order to cover the cost of postage.

22. SHOWS OF KINDRED SOCIETIES IN 1908.

The following dates have been fixed on which R.H.S. Fellows' tickets will admit: -

April 1.—Perpetual Flowering Carnation Society.

April 28.—Auricula and Primula Society.

July 22.—Carnation and Picotee Society.

July 24.—Sweet Pea Society.

September 8.—Dahlia Society.

September 17.—Rose Society.

December 9.—Perpetual Flowering Carnation Society.

Copies of the Schedules for these Shows may be obtained from the Honorary Secretary of each Society. For names and addresses see above dates in programme on pages 41 to 63, "Book of Arrangements," 1908.

23. FORCED BULB SHOW, MARCH 9, 1909.

The President and Council of the Society have decided to make the date March 9, 1909, a general one for the exhibit of collections of Forced Spring Bulbs, with a view to specially demonstrating which varieties (of Daffodils for instance) are best suited for forcing. Exhibits of small collections are invited from amateurs and the trade. R.H.S. Medals will be awarded according to merit.

24. SPECIAL PRIZES, 1909.

(1) THE SHERWOOD CUP.

Mr. Sherwood, V.M.H., has intimated to the Council that in future the annual Cup which he gives to the Society shall be of the value of

twenty guineas, instead of ten guineas as heretofore. It will be offered at the Great Spring Show for a group of Orchids, and will be open to amateurs and trade alike—quality to have more weight than quantity. Ferns and other simple foliage plants may be used for greenery.

(2) HYACINTHS, TULIPS, AND DAFFODILS FORCED IN FIBRE.

Mr. Robert Sydenham has offered, and the Council have accepted, the following prizes to be competed for on March 9, 1909.

N.B.—For bulbs grown in moss fibre or similar material (not earth) and without drainage.

(a) Six single Hyacinths, in separate vases, not to exceed 6 inches in diameter, to be selected from any of the following twelve varieties: Balfour, General Vetter, Grand Lilas, Grand Maitre, Innocence, Isabella. Jacques, Johan, Koh-i-noor, King of the Blues, La Grandesse, and Roi des Belges.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(b) Six vases of Tulips, in vases not to exceed 7 inches, but no restriction as to the number of bulbs in a vase, to be selected from the following varieties: Duchess de Parma, Dusart, Fabiola, Joost van Vondel, Keizerskroon Mon Tresor, Prince of Austria, Rose Gris de Lin, Thomas Moore, Van der Neer, Vermilion Brilliant, White Pottebakker.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(c) Six vases of Narcissi, vases not to exceed 7 inches in diameter, but no restriction as to the number of bulbs in a vase, to be selected from the following varieties: Barii Conspicuus, Campernelle Rugulosus, C. J. Backhouse, Emperor, Frank Miles, Lulworth, Leonie, Mad. de Graaff, Phyllis, Sir Watkin, Victoria, Waterwitch.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(3) FORCED HYACINTHS.

The Council have also accepted the following prizes from the Dutch Bulb Growers' Society at Haarlem to be competed for on March 9, 1909:—

Division I.—For Amateurs and Gentlemen's Gardeners.

(d) Eighteen Hyacinths, distinct.

1st Prize . . .	£6 6s.	4th Prize . . .	£3 8s.
2nd „ . . .	£5 5s.	5th „ . . .	£2 2s.
3rd „ . . .	£4 4s.	6th „ . . .	£1 1s.

(e) Twelve Hyacinths, distinct.

1st Prize . . .	£5 5s.	4th Prize . . .	£2 2s.
2nd „ . . .	£4 4s.	5th „ . . .	£1 1s.
3rd „ . . .	£3 8s.		

(f) Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour to those of the other three pans.

1st Prize . . .	£4 4s.	3rd Prize . . .	£2 2s.
2nd „ . . .	£3 8s.	4th „ . . .	£1 1s.

Division II.—For Nurserymen.

(g) Collection of Hyacinths in pots, pans, or glasses.

Prize. The Gold Medal of the Dutch Bulb Growers' Society at Haarlem.

Regulations.—For Classes (d) and (e), each bulb must be in a separate pot (size optional).

Classes (d), (e), and (f) must all be single spikes; no spikes may be tied together.

Exhibitors in Class (d) may not compete in Class (e) or *vice versa*.

All the bulbs must have been forced entirely in Great Britain or Ireland.

(4) OUTDOOR DAFFODILS.

Messrs. Barr and Sons have presented to the Society a Silver Cup, valued at £7 7s., as a prize for a group of Daffodil blossoms grown entirely outdoors, Polyanthus excluded, Doubles optional, but must include some of each of the other sections, and must contain at least thirty varieties distinct; at least three blooms of each must be shown. Not more than nine blooms of any one variety may be put up. To be staged in bottles, vases, or tubes not exceeding 3 inches in diameter at the top (inside measurement), and all the stems must touch the water. Quality of flower will count more than quantity, and correct naming and tasteful arrangement will be duly considered. Any hardy foliage may be used, Daffodil or otherwise. No prize will be awarded unless there are three competitors at least. Open to amateurs and gentlemen's gardeners only.

Past winners of this Cup may exhibit, but will not be eligible to receive the Cup more than once in three years. In the event of any such previous winner being adjudged "first," a medal will be awarded instead of the Cup, which will go to the next best exhibit, provided that the judges consider it to be of sufficient merit.

(5) FRUIT AND CARNATION PRIZES.

The following Prizes have been accepted from the Trustees of the "Veitch Memorial" at the Autumn Fruit Show, October 15, 1908:—

For five distinct varieties of Grapes, three bunches of each, of which two at least must be white:—First Prize, a Silver Medal and £10; Second, Bronze Medal and £5; Third, Bronze Medal. *Amateurs*.

Also at the Society's Fortnightly Meeting on December 8, a Medal and £5 is offered for the best group of winter-flowering Carnations (either in pots or as cut flowers, or a combination of both), grown by the exhibitor, and occupying a space of 100 square feet. *Amateurs*.

A similar prize is again to be offered for Carnations at the Society's first Exhibition in April 1909.

25. LECTURES.

The new Lecture Room is fitted with an electric lantern of the most modern construction; electric current, gas, and water are laid on, and

every provision has been made for the illustration and delivery of Lectures.

Any Fellows willing to Lecture, or to communicate Papers on interesting subjects, are requested to communicate with the Secretary.

26. EXAMINATIONS, 1909.

1. The Society will hold an examination on Monday, January 11, 1909, specially intended for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. This examination will be conducted in the Royal Horticultural Society's Hall, Vincent Square, Westminster, S.W. The entries close on January 1, 1909.

2. The Society's Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 21, 1909. The examination has two divisions, viz., (a) for Candidates of eighteen years of age and over, and (b) for Juniors *under* eighteen years. Candidates should send in their names not later than March 31. Full particulars may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1907 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Society is prepared to extend this examination to residents in the Colonies; and, at the request of the Government of the United Provinces of India, arrangements have been made to hold this examination in 1909—altered and adapted to the special requirements of India—at Saharanpur next year.

In connection with this examination a Scholarship of £25 a year for two years is offered by the Society to be awarded after the 1909 examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Royal Horticultural Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Royal Horticultural Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

3. The Society will hold an Examination in Cottage Gardening on Wednesday, April 28, 1909. This examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test whatever of such competence. The general conduct of this examination will be on similar lines to that

of the more general examination. Questions on Elementary Chemistry and Biology are now added to this examination.

Medals and Certificates are awarded and Class Lists published in connection with these examinations, and the Syllabus may be obtained on application to the Secretary R.H.S., Vincent Square.

27. INFORMATION.

Fellows may obtain information and advice free of charge from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary R.H.S., Vincent Square, Westminster, S.W. Where at all practicable, it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings so as to be laid before the Scientific or other Committees at once.

28. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz., a fee of £3. 8s. for one day (or £5. 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the *owner*.

29. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of all local Horticultural, Floral, and Gardening Societies by a scheme of affiliation to the R.H.S. Since this was initiated, no less than 200 Societies have joined our ranks, and that number is steadily increasing.

To the privileges of Affiliated Societies have recently been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen copy of a Card which the Council have prepared for the use of Affiliated Societies wishing to have a suitable Card for Certificates, Commendations, &c. It can be used for Fruit or Flowers or Vegetables. Price 8s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz., Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered—price 6d. each.

30. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has recently been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Mutual Improvement Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies, and thus generally to advance the aims and objects of horticulture.

A list of lecturers and their subjects, and also a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary R.H.S., price 3d.

The Secretary of the Society will be very glad to hear from any competent lecturers who are willing to lecture to such Societies that he may enrol them in the Register of Lecturers and bring them into touch with Societies requiring assistance. Others may like to send to him written lectures (with or without lantern slides), that he may have them printed for circulation among these Societies.

Lantern slides on horticultural topics are urgently needed, and their gift will be very much appreciated.

31. CLASSIFICATION OF DAFFODILS.

At the request of the Daffodil Committee the Council recently appointed a Committee to consider the best way of avoiding the confusion, and consequent disputes, likely to arise from the recent multitudinous crossing, recrossing, and intercrossing of the old Divisions of Magni-Medio- and Parvi-coronati. The Committee have delivered their Report instituting an entirely new system of classification, which the Council have (with slight modifications) adopted and confirmed, and ordered to be used at all the Society's Shows. The Report contains a list of every Daffodil known to the Committee, together with the name of the raiser as far as it could be discovered, each flower known being allotted to its appropriate class. The Report has been printed in a handy book form, and can be obtained from the Society's Office, Vincent Square, at a cost of 1s.

32. COLOUR CHART.

Hardly a gardener or florist exists who has not at times longed for a COLOUR CHART—that is to say, for a standard of reference whereby he could himself name, or recognise, or convey to a friend at a distance, the *exact* shade of colour of a flower he desired to procure or had seen advertised, or wished to commend to a friend. Take, for example, the word “crimson,” what a multitude of colours and shades it may be made to include! Some, very beautiful; some, horrible concoctions of red and blue crudely combined.

The Council of the Society have long felt the need of such a Colour Chart, but the huge expense of producing it has hitherto deterred them from issuing it.

Not long since a most admirable chart, containing more than 1,450 shades of colour between white and black, was published in France at the instance of the French Chrysanthemum Society, the price in England being £1 1s. net, and by it it is now possible to *exactly* recognise or describe to a friend or purchaser at a distance the precise colour of any possible flower. You may have met with an Azalea, for instance, which greatly strikes your fancy; you take out your chart and match its shade, and describe it to your friend or your nurseryman as, "Colour: Apricot, p. 53, shade 3," and he turns to his chart and sees *exactly* what it is you want or describe. Or you want to make someone understand the exact shade of a rose in the way of "Andersoni," and you need only say, "Rosy pink, p. 118, shade 4," and your correspondent turns to his chart and sees in a moment exactly what it is you want to describe. Or a nurseryman, having raised a new variety, can by simply quoting "Colour Chart, p. —, shade —," exactly represent to his customers the colour-beauty of his new introduction.

The Council recognising both the excellence and the usefulness of this chart, the idea at once occurred, Could it not be adopted as an International Standard, so that all lovers of flowers all over the world could accurately and exactly describe to one another (no matter how far away or speaking what language) the colour and shade of any particular flower they refer to? There seemed no other difficulty than the somewhat prohibitive cost of £1 1s. net. But difficulties only exist to be overcome, and by undertaking to be responsible for a very large number, the Society is now in a position to offer this Chart to its Fellows at the reduced cost of 14s. 6d., for which price it can be obtained at the Society's Offices, Vincent Square, or it can be sent free by post for 15s.; but in all cases a cheque or postal order must be sent beforehand.

This Chart will, of course, be found vastly useful for many other purposes; for example, a lady wishing to match a certain shade has only to refer her dressmaker to such and such a colour on p. —, shade —, and it can be infallibly matched. An artist wishing to describe the colour of the sky on a certain sundown, can do so exactly by reference to the chart. And in many other like ways it must prove generally useful, containing as it does every possible shade of colour between black and white.

The Council hope that Fellows will avail themselves freely of this offer, as unless a very large number of copies are purchased a great loss will accrue to the Society.

33. MONOGRAPH ON FUNGOID PESTS.

The attention of Fellows is directed to a handsome volume recently published by the Society on Fungoid Pests of Cultivated Plants, by Dr. M. O. Cooke, V.M.H. It consists of 280 pages of letterpress, and is illustrated with 24 coloured plates, containing figures of 360 different fungoid attacks, and 23 woodcuts. The work is divided under the headings of Pests of the Flower Garden, of Vegetables, of Fruit, of the Vinery and Stove, of the Ornamental Shrubbery, of Forest Trees, and of Field Crops. These are followed by a Chapter on Fungicides, which

explains very clearly how to make the different washes and sprays, and also gives the proportions in which the various ingredients should be used.

Each pest is described separately, and means for its prevention or eradication are given, and the whole work is written so as to interest and instruct the cultivator in the simplest and most practical manner. The volume, as published, is half-bound in calf, as it was considered probable that it would form the text-book on the subject for very many years to come; and it thus makes an admirable school prize or gift to a gardener or student of nature. Price 6s., R.H.S. Office, Vincent Square.

"No one whose plants are subject to fungoid attacks—and whose are not?—should be without this book; for not only can they by its use identify the disease at once, but they are also told both how to treat it and overcome it, and also how to make the different washes and sprays which the different classes of fungoid attacks require."

34. RULES FOR JUDGING.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have been revised and considerably modified from the experience gained during the last few years. The Secretaries of Local Societies are therefore strongly advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d. addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

35. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the quite new varieties of Fruits, which promise well, but are not yet sufficiently long proved to be recommended for general planting.

Copies of this most valuable little pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2d., or 25, 2s.; 50, 8s.; 100, 4s.

36. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bond fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bond fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners, when forwarding samples, are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.

1. An opinion on the purity of bone-dust (each sample) 2s. 6d.
2. An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged 5s.
3. An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged 10s.
4. An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged 5s.
5. An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged 10s.
6. An analysis of bone dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged 10s.
7. Determination of potash in potash salts, compound manures, &c. 7s. 6d.
8. An analysis of compound artificial manures, animal products, refuse substances used for manure, &c. from 10s. to £1
9. An analysis of limestone, showing the proportion of lime 7s. 6d.
10. Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime 10s.
11. Complete analysis of a soil £3
12. Analysis of any vegetable product 10s.
13. Determination of the "hardness" of a sample of water before and after boiling 5s.
14. Analysis of water of land-drainage, and of water used for irrigation £1
15. Analysis of water used for domestic purposes £1 10s.
16. Consultation by letter 5s.

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found in the Society's "Book of Arrangements," or can be obtained on application to the Society's Office, Vincent Square, S.W.

EXTRACTS FROM THE PROCEEDINGS
OF THE
ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

MAY 12, 1908.

Mr. A. H. PEARSON in the Chair.

Fellows elected (82).—Miss M. Walters Anson, Mrs. L. A. Ashby, Mrs. C. Barrett, T. Bartens, Lady Battersea, C. F. Bell, A. E. Best, Rev. C. E. Best-Dalison, S. R. C. Bosanquet, Lady Richmond Brown, Mrs. F. Dixon Brown, Mrs. W. E. Buckley, G. Chirnside, General Sir C. Mansfield Clarke, Bart., G.C.B., G.C.V.O., C. A. Close, M.A., B.C.I., Lady Glen Coats, T. R. Cuckney, T. B. Dobbs, Mrs. J. Dunn, Miss E. Edwards, Mrs. G. Forbes, F. S. Foreman, J. H. Forwalk, Miss L. Gamman, Mrs. Gardner, Hon. Mrs. Godman, Miss E. Goodchild, Mrs. H. Tulby Grigg, F. Grotrian, W. H. Weston Hanney, A. S. Hargreaves, Sir A. Seale Haslam, Kt., G. Hatch, A. Heal, A. Hemsley, T. Hillas, Mrs. Byrom Hope, Miss M. Hopton, Miss Inderwick, W. Inderwick, Miss S. Johnstone, Mark H. Judge, A.R.I.B.A., Mrs. H. W. Kemble, N. T. Kershaw, P. M. Kirby, Miss E. M. Lacy, Mrs. S. Lane, Sir C. P. Layard, The Countess of Leven-Melville, Mrs. W. H. Loder, J. MacDonald, Major G. A. Marshall, E. C. Marshall, Rev. C. H. Master, Mrs. P. St. C. Matthey, R. E. Mellersh, Lieut.-Colonel Sir Francis Graham Moon, Bart. W. Morley, Mrs. T. Morton, Mrs. R. Napier, Mrs. W. G. Parkin, P. Leigh Pemberton, Mrs. O. Philipps, F. J. Philp, W. T. Rich, H. S. Shurr, H. J. Shepard, Lady Stanley of Alderley, Major-General J. C. Stewart, C.B., Miss D. H. Stephenson-Peach, Miss K. T. Grant Suttie, W. R. Teage, F. Thompson, Mrs. Tyndale, Mrs. J. van Raalte, Miss C. Walker, Miss A. S. Wallis, Lady M. Welby, Mrs. Wilcox, H. B. Wilson, C. Woodrow, Miss L. Young.

Associates (2).—G. M. Gibbs, J. A. Meech.

Societies affiliated (2).—Cairo Horticultural Society, Torquay Gardeners' Association.

A lecture on "Gardening in the West Highlands" was given by Mr. O. H. Mackenzie (see p. 47).

TEMPLE SHOW.

MAY 26, 27, 28.

JUDGES.

ORCHIDS.

Chapman, H. J.
Fowler, J. Gurney
Little, H.
Wellesley, F.

ROSES.

Jennings, John
May, H. B.
Shea, C. E.

FRUIT AND VEGETABLES.

Bunyard, Geo., V.M.H.
Challis, T., V.M.H.
Poupart, W.

GROUPS IN OPEN AIR.

Chapman, A.
Crump, W., V.M.H.
Pearson, A. H.
Thomson, D. W.

HARDY HERBACEOUS PLANTS.

Beckett, E., V.M.H.
Bowles, E. A.
Grandfield, J.
Ware, W. T.

SPECIAL AND VEITCHIAN CUP.

Bilney, W. A.
Fowler, J. Gurney
Gibson, Jas.

FOLIAGE PLANTS.

Bain, W.
Barnes, N. F.
Hudson, J., V.M.H.
McLeod, J. F.

ROCK AND ALPINE PLANTS.

Bilney, W. A.
Clutton-Brock, A.
Lynch, R. Irwin, V.M.H.

FLOWERING PLANTS.

Howe, W.
Paul, G., V.M.H.
Reynolds, G.

MISCELLANEOUS.

Dixon, C.
Douglas, Jas., V.M.H.
Notcutt, R. C.
Odell, J. W.

Lawrence, Sir Trevor, V.M.H.
Methven, J.
Whytock, Jas.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Floral and Orchid Committees will be found in their respective reports.

Veitchian Cup, value Fifty-five Guineas.

F. Menteith Ogilvie, Esq., The Shrubbery, Oxford (gr. Mr. Balmforth) for Orchids.

Gold Medal.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. H. G. Alexander), for Orchids.

Messrs. Charlesworth, Heaton, Bradford, for Orchids.

Messrs. W. Cutbush, Highgate, for Roses, Carnations, alpiners, and topiary work.

Messrs. Hugh Low, Bush Hill Park, for Orchids, Carnations, Roses, and Figs.

Messrs. F. Sander, St. Albans, for Orchids and rare plants.

Messrs. J. Veitch, Chelsea, for flowering trees and shrubs, foliage and greenhouse plants.

Silver Cup.

Sir Jeremiah Colman, Bart., Gatton Park, Reigate (gr. Mr. W. P. Bound), for Orchids.

Hon. Vicary Gibbs, Aldenham House, Elstree (gr. Mr. E. Beckett, V.M.H.), for Pelargoniums and Streptocarpus.

W. James, Esq., West Dean Park, Chichester (gr. Mr. W. H. Smith), for Carnations and Tree Paeonies.

C. F. Raphael, Esq., Shenley, Herts (gr. Mr. A. Grubb), for Malmaison Carnations.

Messrs. Barr, Covent Garden, for alpiners, pygmy trees, and hardy flowers.

Messrs. Blackmore & Langdon, Twerton-on-Avon, for Begonias.

Messrs. Geo. Bunyard, Maidstone, for fruit trees, fruit, and hardy flowers.

Messrs. J. Cheal, Crawley, for trees and shrubs, alpiners, and hardy flowers.

Messrs. T. Cripps, Tunbridge Wells, for Japanese Maples and other ornamental trees.

Messrs. R. & G. Cuthbert, Southgate, for Azaleas.

Messrs. J. Cypher, Cheltenham, for Orchids.

Messrs. G. Jackman, Woking, for Clematis and hardy herbaceous plants.

Messrs. R. P. Ker, Aigburth Nursery, Liverpool, for Hippeastrums.

Messrs. H. B. May, Upper Edmonton, for ferns and flowering plants.

Messrs. Paul, Cheshunt, for Roses and hardy trees and shrubs.

Messrs. Wm. Paul, Waltham Cross, for Roses, Rhododendrons, and ornamental trees.

Mr. Amos Perry, Enfield, for alpiners, aquatics, Lilies, and herbaceous flowers.

Mr. M. Prichard, Christchurch, Hants, for herbaceous flowers and alpiners.

Messrs. Pulham, 71 Newman Street, W., for rock-work planted with rock plants.

Mr. L. R. Russell, Richmond, for hardy ornamental trees and shrubs.

Messrs. R. Smith, Worcester, for ornamental trees, Clematis, and hardy flowers.

Messrs. Sutton, Reading, for flowering plants and Potatoes.

Mr. C. Turner, Slough, for Roses and Azaleas.

Messrs. R. Wallace, Colchester, for hardy herbaceous, and bulbous plants.

Messrs. J. Waterer, Bagshot, for Rhododendrons and flowering plants.

Silver-gilt Flora Medal.

- R. Ashworth, Esq., Newchurch, Manchester, for Orchids.
 Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.
 Mr. A. J. A. Bruce, Chorlton-cum-Hardy, for Sarracenias.
 Mr. H. Burnett, St. Margaret's, Guernsey, for Carnations.
 Messrs. H. Cannell, Swanley, for Cannas, Calceolarias, and Cacti.
 Messrs. J. Carter, High Holborn, for flowering and foliage plants.
 Messrs. A. Dickson, 55 Royal Avenue, Belfast, for Tulips.
 Mr. A. F. Dutton, Iver, Bucks, for Carnations.
 Messrs. J. Hill, Edmonton, for ferns.
 Messrs. Hobbies, Dereham, for Roses.
 Mr. G. Mount, Canterbury, for Roses.
 Mr. G. Reuthe, Keston, for alpinas, shrubs, and hardy flowers.
 Messrs. T. S. Ware, Feltham, for alpinas, Begonias, and hardy plants.

Silver-gilt Knightian Medal.

- Messrs. Laxton, Bedford, for Strawberries.
 Messrs. T. Rivers, Sawbridgeworth, for fruit trees in pots.

Silver-gilt Banksian Medal.

- Messrs. Baker, Wolverhampton, for hardy plants, Lilies, and Violas.
 Mr. J. R. Box, West Wickham, Kent, for Begonias, alpine, and rock plants.

The Craven Nursery Co., Clapham, Lancaster, for alpinas and *Trillium grandiflorum*.

- Messrs. W. Fromow, Chiswick, for Japanese Maples.
 Mr. R. C. Notcutt, Woodbridge, for hardy flowers.
 Messrs. J. Peed, West Norwood, for Caladiums, Gloxinias, and alpinas.

Silver Lindley Medal.

- F. Menteith Ogilvie, Esq., The Shrubbery, Oxford (gr. Mr. Balmforth), for Orchids.

Silver Flora Medal.

- Mr. C. W. Breadmore, Winchester, for Sweet Peas.
 Messrs. B. R. Cant, Old Rose Gardens, Colchester, for Roses.
 Messrs. F. Cant, Braiswick Nursery, Colchester, for Roses.
 Messrs. Dobbie, Rothesay, for Pansies, Violas, and Sweet Peas.
 Mr. R. Gill, Tremough Gardens, Penryn, for Rhododendrons.
 Messrs. Hogg & Robertson, 22 Mary Street, Dublin, for Tulips.
 Messrs. J. Laing, Forest Hill, for Begonias and Caladiums.
 Messrs. McBean, Cooksbridge, Sussex, for Orchids.
 Messrs. J. W. Moore, Rawdon, Leeds, for Orchids.
 Messrs. D. Russell, Brentwood, for hardy ornamental trees and shrubs.
 Mr. A. R. Upton, Hardy Plant Nursery, Guildford, for alpinas, herbaceous plants, and rock garden.
 Mr. O. F. Waters, Deanlands Nursery, Balcombe, for Carnations.
 Messrs. E. Webb, Stourbridge, for Calceolarias.

Silver Knightian Medal.

- Robert Stephenson, Esq., J.P., Burwell, Cambridge, for Asparagus.
 The Thatcham Fruit and Vegetable Farm, Newbury, for vegetables.

Silver Banksian Medal.

Howard H. Crane, Esq., 4 Woodview Terrace, Highgate, N., for *Violas*.

J. D. Enys, Esq., Penryn, Cornwall (gr. Mr. P. Hogbin), for *Myosotidium nobile*.

Mr. W. Pingo Horton, Seaford, for alpinæ and herbaceous plants.

Messrs. R. H. Bath, Wisbech, for herbaceous flowers, Carnations, and Tulips.

Messrs. Bell & Sheldon, Guernsey, for Carnations.

Messrs. W. Bull, Chelsea, S.W., for Orchids, ornamental plants, etc.

Mr. A. Ll. Gwillim, Eltham, Kent, for Begonias.

Mr. A. J. Harwood, Colchester, for Asparagus.

The Misses Hopkins, Shepperton-on-Thames, for alpine and rock plants.

Mr. T. Jannock, Dersingham, for Lilies of the Valley and Lilacs.

The King's Acre Nurseries, Hereford, for hardy herbaceous plants.

Messrs. B. Ladhams, Shirley, Southampton, for hardy flowers.

Mr. Frank Lilley, Guernsey, for Gladioli and other bulbous plants.

Mr. W. H. Page, Hampton, Middlesex, for Carnations.

Mr. G. Prince, Longworth, Berks, for Roses.

Messrs. Watkins & Simpson, 12 Tavistock Street, W.C., for vegetables and salads.

Mr. A. Wilson, East Keal, Spilsby, for Tulips.

GENERAL MEETING.

JUNE 9, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair.

Fellows elected (192).—Colonel Harvey Alexander, Mrs. Allinson, Mrs. H. E. Anderson, D. C. Apperby, W. C. Archibald, W. G. Barnes, Mrs. A. Bibby, R. Blagden, Miss G. Blewitt, D. Bliss, L. Brassey, Admiral Sir F. Bridgeman, Mrs. Brinsden, Hon. Mrs. F. Butler, P. Compton, Mrs. C. Luson Cribb, The Countess of Dalhousie, Mrs. C. Dewhurst, C. H. Dowling, Mrs. M. R. Dunk, Lady Dunn, W. R. Durrad, J. Edwards, Viscountess Ennismore, W. Fawcett, B.Sc., F.L.S., Mrs. T. Fletcher-Adams, Mrs. A. E. Francis, E. A. Freeman, G. L. Fulford, Mrs. Clifton Gascoigne, T. M. Gibbon, Guy Gilbey, Hon. Mrs. Goldman, Miss E. Gooch, A. Gordon, Mrs. J. Gordon, Mme. C. Gosch, Miss T. Gosse, Mrs. H. Grant, Miss D. Groom, Mrs. H. Gwyther, Mrs. Wedderburn Halkett, G. A. Hammond, J. M. Hanbury, F. W. Harmer, J.P., F.G.S., Mrs. R. Helme, T. Heron, Mrs. Hewitt, C. Hawkins Hext, D. Hills, Commander G. Hodgkinson, R.N., Mrs. Hogg, Lady Hulton, Mrs. R. Murray Hyslop, H. Joy, Mrs. F. Basil Kempe, G. L. T. Kenyon, Mrs. E. Lamb, Mrs. W. H. Lancaster, Miss J. Marshall Leckie, Mrs. Le Mesurier, C. H. Lepine, Mme. Leroy, Countess of Listowel, Mrs. Littledale, Miss F. M. Maclean, Mrs. G. Marjoribanks, Miss E. Maw, Mowbray T. Maw, J. Maynard, Mrs. E. H. Mitchell, R. Mordecai, M. Murchison, Mrs. S. E. Muter, Captain R. L. G. Noel, R.N., Sir H. North, Mrs. C. Oldfield,

Colonel H. Dacres Oliver, J. H. Osborne, F. B. Palmer, C. Arthur Pearson, E. L. Peel, W. R. Pennell, Mrs. G. D. Perks, Mrs. Pharazyn, Mrs. R. Potts, Mrs. Pringle of Forquhan, J. Telford Quick, J. E. Radcliffe, W. H. Redshaw, Mrs. S. H. Ricardo, Captain H. E. Rose, J. Rowntree, Hon. Mrs. Ryder, Mrs. Salaman, P. Schloesser, Otto Seelisch, Rev. W. Serjeantson, D. W. Sissons, T. A. Skeate, F. N. Smith, J.P., W. E. Stanley, Mrs. W. Hatton Stansfield, A. D. Steel-Maitland, Sir C. C. Stevens, K.C.S.I., J. N. Stuart, Lady Susan Sutton, E. Ruthven Sykes, F.L.S., F.Z.S., G. A. Talbot, Mrs. J. D. Tannahill, S. J. Tavenor, A. C. Thompson, Mrs. D. F. Tomalin, Miss K. Tompson, Mrs. F. T. Trouton, Miss Troyte-Bullock, H. Wainwright, Rev. Martin S. Ware, A. Watkin, Mrs. Watkin, Miss J. Way, H. Hallifax Wells, C. E. B. Welsh, Miss L. Wheeler, Newton H. White, Mrs. C. Wilkin, C. H. Wilkinson, F.R.G.S., Miss A. M. Winter, E. J. Wood, J. C. Wood, Mrs. J. Wyatt, A. Young.

Fellows resident abroad (8).—E. W. Davy (Nyassaland), J. Kersbergen (Holland), Mrs. G. P. Pierce (New Zealand), H. Prins (Holland), A. M. v. d. Steenhoven (Holland), J. van Aalst (Holland), Mrs. Townend (New Zealand), Louis Voraz (France).

Associates (12).—Miss M. Cochrane, Miss L. Flygare, A. H. Hancock, Miss J. C. Hollway, E. J. Lingwood, Miss B. K. Newill, Miss N. B. Reid, Miss S. Siemens, Miss E. M. Stubington, Miss E. Thomas, H. F. Upton, Miss E. Woods.

Societies affiliated (1).—Bromsgrove Horticultural Society.

A lecture on "Yellow Stripe in Daffodils" was given by Mr. H. R. Darlington (see p. 161).

VISIT TO WINDSOR AND FROGMORE.

JUNE 10, 1908.

By the kind permission of His Majesty the King and through the interest of Lieut.-Colonel G. L. Holford, C.I.E., C.V.O., the Council and Standing Committees of the Royal Horticultural Society visited Windsor Castle, the Royal Mausoleum, and Frogmore Gardens on June 10, 1908.

On arriving at Windsor the party, numbering about 100, were received at the Guildhall by His Worship the Mayor (G. Bampfylde, Esq.), who most hospitably entertained them all at luncheon in the quaint old Council Chamber of the Borough.

At the conclusion of a most enjoyable luncheon and after the usual loyal toasts had been given, the "Health of the Mayor" was proposed by Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., President of the Society, and responded to by His Worship.

The party then proceeded to the Castle, and were shown over St. George's Chapel, the Memorial Chapel, and the State apartments. A pleasant walk by way of the Terrace Gardens and the Home Park led to the Royal Mausoleum, with its beautiful recumbent statues of Queen Victoria and the Prince Consort, who was President of our Society up to the date of his untimely death.

The lawns surrounding Frogmore House were then passed through on the way to Frogmore Gardens, where the party were received by Sir

Dighton Probyn, V.C., G.C.B., and Mr. Mackellar, Head Gardener to His Majesty the King. The miles of glasshouses and the luxuriant crops of outdoor fruits and vegetables, interspersed with borders of roses and old-fashioned herbaceous plants, were inspected. It is needless to say that all showed evidence of the greatest possible care and skill.

At 5 o'clock carriages took the party back to Windsor, where farewell was taken of the Mayor and the other gentlemen who had so greatly added to the pleasure of a most pleasant day.

EXHIBITION OF COLONIAL-GROWN FRUIT AND VEGETABLES AND OF COLONIAL PRESERVES.

JUNE 11 AND 12, 1908.

JUDGES.

Bunyard, Geo., V.M.H.

Marshall, W., V.M.H.

Butt, Geo.

Rivers, T. A. H.

Fielder, C. R.

Wilks, Rev. W., M.A.

Gold Medal.

The West Indian Produce Association, for fruits and preserves.

The Government of New Zealand, for collection of Apples and Pears.

Silver-gilt Knightian Medal.

The Permanent Exhibition Committee of Dominica, for Limes.

Messrs. R. Jackson, 172 Piccadilly, W., for preserves.

Messrs. T. Rivers, Sawbridgworth, for Fruit Trees in pots.

Messrs. Yuill, 120 Fenchurch Street, E.C., for collection of Apples.

The Agent-General for Western Australia, for Apples, Pears, and Grapes.

Mr. E. Westmacott, 150 Leadenhall Street, E.C., for Wines.

Mr. J. Sedgwick, of Cape Town, for Wines.

Miss C. E. Martin, of Willowbrook, Auburn, N.Y., for preserved fruits.

Silver-gilt Banksian Medal.

Mr. E. Blakeway, Christchurch, N.Z., for Apples.

Silver Flora Medal.

The Natal Bulb Growers' Association, Durban, for bulbs of *Lilium Harrisii*.

Silver Knightian Medal.

Messrs. Clarke, Whangarei, N.Z., for preserved fruits.

The Western Province Preserving Co., P.O. Orchard Siding, for preserves.

Messrs. J. Veitch, Chelsea, for Fruit Trees in pots.

Mr. M. G. Anderson, Adelaide, for collection of Apples.

Silver Banksian Medal.

The Dominica Fruit Growers' Association, for Limes.

"Tropical Life," 112 Fenchurch Street, for Cacao Beans.

Mr. George Barrett-Lennard, of Guildford, Western Australia, for Grapes.

Messrs. Sounness, of Western Australia, for Apples and Pears.

Bronze Banksian Medal.

Mr. H. C. Williamson, Melbourne, for four cases of Apples.

Hon. J. Cox Fillan, of Wall House, Dominica, for Limes.

Mr. A. D. Riviere, Clarke Hall Estate, Dominica, for Limes.

Mrs. Sophia Miller, Moyleen, Marlow, for Chutneys.

A lecture on "The Future of Cacao Planting in the West Indies" was given by Mr. H. Hamel Smith (see p. 168).

DEPUTATION TO THE GRAND YORKSHIRE FLORAL
EXHIBITION, YORK (JUBILEE YEAR).

JUNE 17, 1908.

THE Society was represented at the Jubilee Meeting of the old Yorkshire Society at York, on June 17, 1908, by Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., Sir Albert Rollit, J.P., Messrs. H. B. May, Harry J. Veitch, and the Rev. W. Wilks, M.A., accompanied by Mr. Arthur J. Gaskell, assistant secretary. The deputation were accorded a reception and hospitality of a typically Yorkshire type in warmth and heartiness. They were entertained at dinner on the evening of June 16 by the chairman of the York Show Committees (Mr. Alderman S. Border) and his sub-chairman, and on the following evening, at a Grand Banquet at the Mansion House, by the Right Hon. the Lord Mayor of York (Sir Joseph Rymer, Kt.).

The display of flowers and plants, groups and rockwork was an exceedingly good one, probably the best that has ever been seen in the provinces, and the deputation, acting under the powers conferred upon them by the Council, made the following awards:—

Gold Medal.

Mr. W. A. Holmes, Chesterfield, for a group arranged for effect.

Mr. John Coulthurst, Gargrave House, Leeds, for a group of miscellaneous plants.

Messrs. J. Backhouse, York, for a very fine group consisting of rockwork with plants and water.

Lieut.-Colonel G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury, for Orchids.

Messrs. James Veitch, of Chelsea, for a group of Orchids and rare plants.

Silver Cup.

Mr. Joseph Pickersgill, Bardon Hill, Weetwood, Leeds, for a group arranged for effect.

Mr. J. S. Sharp, Almondbury, Huddersfield, for a miscellaneous group.

Mr. James Blacker, Thorpe Villas, Selby, for a miscellaneous group.

Mr. Geo Prince Longworth Berks for Roses.

Messrs. Cypher, Cheltenham, for rare plants.

The Duke of Portland, Welbeck Abbey, for fruit.

The Earl of Harrington, Elvaston Castle, Derby, for fruit.

Messrs. R. Smith, Worcester, for herbaceous plants.

Messrs. R. H. Bath, Wisbech, for Paeonies, &c.

Messrs. Geo. Bunyard, Maidstone, for herbaceous plants.

Messrs. Hugh Low, Bush Hill Park, for a group of Orchids, Carnations, and Hydrangeas.

Messrs. Kelway, Langport, Somerset, for herbaceous plants.

Messrs. R. P. Ker, Grassendale, Liverpool, for Hippeastrums.

Messrs. Dicksons, Chester, for Paeonies.

Messrs. Artindale, Sheffield, for herbaceous plants.

Silver-gilt Flora Medal.

Mr. Wm. Vause, Leamington, for a group arranged for effect.

Mr. J. Wood, Boston Spa, York, for herbaceous plants.

Messrs. W. & J. Brown, Peterborough, for Roses.

Mr. Geo. Mount, Canterbury, for Roses.

Messrs. J. Moore, Rawdon, Leeds, for Orchids.

Mr. W. P. Burkinshaw, Hessle, Yorks, for Orchids.

Messrs. G. Gibson, Bedale, for hardy flowers.

Messrs. Harkness, Bedale, for hardy flowers.

Messrs. John Peed, West Norwood, for Caladiums.

Silver-gilt Knightian Medal.

Messrs. Sutton, Reading, for Melons and vegetables.

Hogg Medal.

Messrs. Laxton, Bedford, for Fruit.

Williams Memorial Medal.

The Earl of Londesborough (gr. Mr. McPherson) for the best group from Yorkshire Gardens—Commemorative Class.

Silver Flora Medal.

Mr. John Forbes, Hawick, for Pentstemons.

Mr. Chas. W. Breadmore, Winchester, for Sweet Peas.

Mr. W. Kettlewell, York, for Fuchsias.

Mr. W. F. Crowther, York, for Geraniums.

Messrs. Kent & Bryden, Darlington, for Shrubs.

Silver Banksian Medal.

Messrs. E. J. Batchelor, Harrogate, for *Nephrolépis*.

Mr. J. E. Skaife, York, for Roses.

Awards of Merit.

Nepenthes excelsa, from Messrs. James Veitch, Chelsea.

Marguerite 'Pink Queen Alexandra,' from Messrs. R. I. Ker, Liverpool.

Highly Commended.

The deputation wished to signify their high commendation of all the exhibits of Messrs. J. Backhouse, of York.

GENERAL MEETING.

JUNE 23, 1908.

Professor N. E. Hansen, of Brookings, S. Dakota, U.S.A., in the Chair.

Fellows elected (27).—H. C. V. Adams, R. D. Adkins, Mrs. A. Astle, Mrs. Bankes, Miss Blundell, H. O. Blyth, Miss C. H. Bradshaw, Mrs. Muirhead Campbell, Mrs. Cundell, M. Gray, Miss M. Low, E. H. Mackie, C. H. Miller, M.D., Mrs. A. E. Mills, Ronald Peake, T. Pim, W. H. Poate, A. A. Saltren-Willett, Mrs. Sims, Miss C. M. Smith, Mrs. Smithers, N. Spens, Mrs. A. Dunbar Stables, Mrs. F. Summers, W. G. Tarrant, Miss E. Varco Williams, H. S. Lee Wilson.

Fellows resident abroad (8).—F. Hosking (Africa), G. H. Krum-biegel (India), R. Chunder Mukerji (India).

Societies affiliated (9).—Burghfield and Sulhampstead Horticultural Society; Pangbourne Horticultural Society; Woodstock Horticultural Society.

A lecture on "The Absorption of Rain and Dew by the green parts of Plants" was given by Professor G. Henslow, F.L.S., V.M.H. (see p. 167).

At this meeting the President and Council received and extended a hearty welcome to about 100 members of the Société Nationale d'Horticulture de France. After inspecting the Show, the party was entertained to light refreshments in the lecture-room and an address of welcome was delivered by the President, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., and responded to by Monsieur Viger the President of the French Society.

DEPUTATION TO THE NEWCASTLE FLOWER SHOW.

JULY 1, 1908.

A DEPUTATION of the Royal Horticultural Society attended, by invitation, the Annual Flower Show of the Durham, Northumberland and Newcastle-upon-Tyne Botanical and Horticultural Society, held on July 1, 1908, in conjunction with the Royal Agricultural Society's Show at Newcastle. The deputies appointed—viz. the Hon. John Boscawen, and Messrs. H. Hindmarsh, H. B. May, and A. H. Pearson, with the Assistant Secretary—were most kindly and hospitably received by the President of the Newcastle Society (Alderman Sir Joseph Ellis, J.P.), the Chairman (Mr. Councillor Johnstone Wallace), the Vice-Chairman (Alderman John Beattie, J.P.), and the Secretary (Mr. J. Wilfrid Pace), and were entertained at an excellent dinner at Tilley's on the evening of June 30.

The deputation assembled on the Show ground at 10 o'clock on the morning of July 1, and examined the exhibits. The plants and flowers, sent by about seventy exhibitors, were arranged in three large tents, the Show being the largest held at Newcastle for several years past. In view of the Royal Agricultural Show being held there, the Flower Show Committee had made a special effort to obtain a representative display of the horticulture of the North of England. A well-merited success was achieved, for the Show will undoubtedly be long remembered as one of the prominent floral exhibitions of the year 1908.

The deputation made the following awards :—

Gold Medal.

- Mr. J. S. Sharp, Almondbury, for miscellaneous group.
Messrs. Smith, Worcester, for shrubs.
Messrs. Backhouse, York, for rock, alpine, and water gardens.
Mr. F. M. Bradley, Peterboro', for Roses.

Silver-gilt Flora Medal.

- Messrs. Hugh Low, Bush Hill Park, for a mixed group.
Mr. E. Edmondson, Grainger Arcade, Newcastle, for flowers.
Messrs. Backhouse, York, for shrubs.
The Lord Barnard, Raby Castle (gr. Mr. Tullett), for decorated table.
A. E. Bainbridge, Esq., Lynwood, Newcastle (gr. Mr. Bell), for group.

Silver-gilt Knightian Medal.

- The Lord Londesborough, arket Weighton (gr. Mr. McPherson), for fruit.
Messrs. Laxton, Bedford, for Strawberries.

Silver-gilt Banksian Medal.

- Mr. C. F. Waters, Balcombe, for Carnations.
Messrs. Dobbie, Rothesay, for Sweet Peas, Pansies, &c.
Messrs. Brown, Peterborough, for herbaceous plants.
Messrs. Bath, Wisbech, for Roses, Carnations, &c.
Messrs. J. Robson, Hexham, for shrubs.
Messrs. Harkness, Leeming Bar, Bedale, for herbaceous plants, &c.
Messrs. W. Cutbush, Highgate, for Carnations.
Messrs. Ord, North Shields, for a decorative group.

Silver Flora Medal.

- Mr. Lawrenson, Gallowgate, Newcastle, for foliage and flowering plants.
Messrs. Dicksons, Chester, for flowers.
Messrs. Blackmore and Langdon, Bath, for Begonias.
Messrs. Ord, North Shields, for ferns and herbaceous plants.
Mr. Lawrenson, Gallowgate, Newcastle, for Carnations.
Mr. H. Bolton, Warton, Carnforth, for Sweet Peas.
Messrs. Little & Ballantyne, Carlisle, for shrubs.
Mr. F. Edmondson, Westerhope, for decorated table.
Mr. Mark Purvis, Benton Park, for decorated table.
Messrs. Kent & Bryden, Darlington, for shrubs and flowering plants.
Messrs. G. Gibson, Leeming Bar, Bedale, for herbaceous plants.

Silver Knightian Medal.

- The Lord Barnard, Raby Castle, Darlington (gr. Mr. Tullett), for fruit.

Silver Banksian Medal.

- Mr. H. A. Inness, Croft Spa, for Carnations.
Mr. C. W. Breadmore, High Street, Winchester, for Sweet Peas.

Mr. H. A. Inness, Croft Spa, for Orchids.

Messrs. Fell, Hexham, for decoration of Royal Pavilion.

Highly Commended.

The deputation wish to signify their very high appreciation of the rock, alpine, and water gardens arranged and exhibited by Messrs. Backhouse, of York, to whom they awarded the Gold Medal of the Society.

HOLLAND HOUSE SHOW.

JULY 7 AND 8, 1908.

JUDGES.

ORCHIDS.

Chapman, H. J.

Fowler, J. Gurney

Little, H.

Wellesley, F.

ROSES.

Goodwin, A. R.

May, H. B.

Philbrick, Miss

Willmott, Miss, V.M.H.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.

Pearson, A. H.

Poupart, W.

GROUPS IN OPEN AIR.

Chapman, A.

Douglas, J., V.M.H.

Jennings, John

HARDY HERBACEOUS PLANTS.

Bennett-Poë, J. T., V.M.H.

Bowles, E. A.

Shea, Chas. E.

Thatcher, A. E.

ALPINE AND ROCK PLANTS.

Bilney, W. A.

Boscawen, Rev. Arthur

Pearson, C. E.

Ware, W. T.

FOLIAGE PLANTS.

Bain, W.

Fielder, C. R.

Hudson, James, V.M.H.

McLeod, J.

FLOWERING PLANTS.

Bates, W.

Howe, W.

Reynolds, G.

Turner, Arthur

MISCELLANEOUS.

Dixon, C.

Notcutt, R. C.

Turner, T. W.

IMPLEMENTS AND SUNDRIES.

Beckett, E., V.M.H.

Divers, W. H.

Parr, H.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit but is purely accidental.

Other awards given on the recommendation of the Fruit, Floral and Orchid Committees will be found in their respective reports.

The Sherwood Cup.

This Cup was offered for twenty-four bunches of Roses with their own foliage, shown in vases by amateurs.

Two exhibits were entered for the Cup, but it was withheld on the report of the Judges that neither of them was quite up to the standard warranting the award of this Cup. The Council awarded each of the competitors, Dr. D. L. Freeland, of Snodland, and E. E. Grimson, Esq., of Sutton, a Silver Banksian Medal.

Gold Medal.

Lord Llangattock, The Hendre, Monmouth (gr. Mr. T. Coomber), for Pineapples and Strawberries.

Hon. Vicary Gibbs, Aldenham House, Elstree (gr. Mr. E. Beckett, V.M.H.), for a collection of vegetables.

Messrs. Frank Cant, Colchester, for Roses.

Messrs. Charlesworth, Heaton, Bradford, for Orchids.

Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Messrs. Hobbies, Dereham, for Roses, and Rose-trees in pots.

Messrs. H. B. May, Upper Edmonton, for Ferns and miscellaneous plants.

Messrs. Paul, Cheshunt, for Roses and hardy flowers.

Messrs. Wm. Paul, Waltham Cross, for Roses.

Mr. Amos Perry, Enfield, for a natural water-garden.

Messrs. J. Veitch, Chelsea, for Carnations, stove, foliage and flowering plants.

Messrs. R. Wallace, Colchester, for hardy herbaceous plants and water garden.

Silver Cups.

S. Heilbut, Esq., Holyport, Maidenhead (gr. Mr. G. Camp), for fruit trees in pots.

Messrs. W. Artindale, Sheffield, for Violas, herbaceous and alpine plants.

Messrs. Bell & Sheldon, Guernsey, for Carnations.

Messrs. Blackmore & Langdon, Twerton-on-Avon, for Begonias and Delphiniums.

Mr. C. W. Breadmore, Winchester, for Sweet Peas.

Messrs. W. Bull, Chelsea, for foliage plants and flowers.

Messrs. G. Bunyard, Maidstone, for fruit trees, dish fruit, Roses, and hardy flowers.

Messrs. H. Cannell, Swanley, for Cannas.

Messrs. B. R. Cant, Colchester, for Roses.

Messrs. J. Carter, High Holborn, for Sweet Peas, Gloxinias and edible Peas.

Messrs. G. & A. Clark, Dover, for ornamental shrubs and hardy flowers.

Messrs. T. Cripps, Tunbridge Wells, for Japanese Maples and other ornamental trees.

Messrs. W. Cutbush, Highgate, for foliage and flowering plants.

Messrs. R. & G. Cuthbert, Southgate, for Roses and flowering plants.

Messrs. A. Dickson, Newtownards, co. Down, for new Roses.

Messrs. H. Low, Bush Hill Park, for Orchids, Carnations, Roses and greenhouse plants.

Messrs. J. W. Moore, Rawdon, Leeds, for Orchids.

Mr. W. H. Page, Hampton-on-Thames, for Carnations and Lilies.

Mr. M. Prichard, Christchurch, Hants, for herbaceous plants and water garden.

Mr. L. R. Russell, Richmond, for stove and greenhouse plants, Ivies, and ornamental trees.

Messrs. F. Sander, St. Albans, for Orchids and new plants.

Silver-gilt Flora Medal.

Messrs. Barr, Covent Garden, for Japanese pygmy trees and hardy flowers.

Mr. W. R. Chaplin, Waltham Cross, for Roses and Sweet Peas.

Messrs. J. Cheal, Crawley, for ornamental trees and shrubs.

Messrs. G. Jackman, Woking, for Clematis and hardy flowers.

Mr. G. Mount, Canterbury, for Roses.

Messrs. J. Peed, West Norwood, for Caladiums, Gloxinias and alpinas.

Messrs. T. S. Ware, Feltham, for alpinas, Begonias, Carnations and hardy plants.

Silver-gilt Knightian Medal.

Messrs. Laxton, Bedford, for Strawberries.

Silver-gilt Banksian Medal.

Messrs. R. H. Bath, Wisbech, for Carnations and Roses.

Mr. H. Burnett, Guernsey, for Carnations.

The Misses Hopkins, Shepperton-on-Thames, for herbaceous, alpine and rock plants.

Messrs. E. W. King, Coggeshall, for Sweet Peas.

Mr. G. Reuthe, Keston, for flowering shrubs, alpine and rock plants.

Mr. C. Turner, Slough, for Roses.

Silver Flora Medal.

Sir G. Faudel-Phillips, Bart., Balls Park, Hertford (gr. Mr. Fitch), for Carnations.

Messrs. S. Bide, Farnham, Surrey, for Roses and Sweet Peas.

Mr. John Forbes, Hawick, N.B., for Phloxes and Pentstemons.

Messrs. W. Fromow, Chiswick, for Japanese Maples and hardy plants.

Messrs. Gunn, Olton, Birmingham, for new hardy Phlox.

Mr. A. Ll. Gwillim, New Eltham, for Begonias.

Messrs. Jones, Shrewsbury, for Sweet Peas.

The King's Acre Nurseries, Hereford, for Roses and hardy flowers.

Messrs. B. Ladhams, Shirley, Southampton, for hardy flowers.

Messrs. Laing, Forest Hill, for Begonias, Caladiums, and Crotons.

Messrs. H. Lane, Berkhamsted, for hardy trees and shrubs.

Mr. F. Lilley, Guernsey, for Gladioli and Irises.

Messrs. H. Merryweather, Southwell, for Roses.

Mr. R. C. Notcutt, Woodbridge, for Roses, flowering shrubs, and hardy flowers.

Mr. H. C. Pulham, Elsenham, for alpinas.

Messrs. Stanley, Southgate, for orchids.

Messrs. G. Stark, Gt. Ryburgh, for Sweet Peas.

Messrs. Sutton, Reading, for Sweet Peas.

Silver Knightian Medal.

Mr. S. Mortimer, Farnham, for Melons, Cucumbers, and Tomatos.

Swanley Horticultural College, Kent, for a collection of fruit.

Silver Banksian Medal.

H. P. Burrell, Esq., Brooklands, Alton, for herbaceous plants.

Dr. D. L. Freeland, Snodland, for Roses.

E. E. Grimson, Esq., York House, Sutton, for Roses.

Col. C. Heseltine, 196 Queen's Gate, S.W., for Roses.

F. Wellesley, Esq., J.P., Westfield Common, Woking, for Sweet Peas.

Messrs. W. & J. Brown, Stamford, for Roses, Heliotropes, Geraniums, and Verbenas.

Messrs. Kelway, Langport, for Delphiniums, Gaillardias, and Pæonies.

Messrs. J. K. King, Coggeshall, for Sweet Peas.

The Misses Kipping, Hutton, Essex, for alpine and herbaceous plants.

Messrs. G. Mallett, Cheddar, for hardy herbaceous plants and water garden.

Mr. V. Slade, Taunton, for Zonal Pelargoniums.

Messrs. R. Smith, Worcester, for Gloxinias and Caladiums.

Mr. A. R. Upton, Hardy Plant Nursery, Guildford, for hardy herbaceous plants.

HORTICULTURAL SUNDRIES.

Silver Cup.

Messrs. T. Green, Southwark Street, S.E., for lawn mowers and garden rollers.

Silver-gilt Flora Medal.

Messrs. W. Wood, Wood Green, for Japanese summer-house and garden sundries.

Silver Flora Medal.

Messrs. Inmans, Stretford, Manchester, for rustic summer-houses.

The Potters' Arts Guild, Compton, Guildford, for terra-cotta garden pottery.

Messrs. Pulham, 71 Newman Street, W., for 'Pulhamite Stone' vases.

Mr. G. W. Riley, Herne Hill, for rustic summer-houses and arches.

Messrs. H. Scott, South Norwood, for garden furniture and sundries.

Silver Knightian Medal.

Messrs. R. Jackson, 172 Piccadilly, W., for Cape bottled fruit and jams.

Miss C. E. Martin, Auburn, New York, for preserved fruits.

Silver Banksian Medal.

Messrs. Castle's, Millbank, for teak wood garden seats and tables.

Messrs. de Luzy Frères, 4 Knatchbull Road, S.E., for the 'National' Knapsack sprayer, pumps, and powder bellows.

cviii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Mr. Alex. Hamilton, 11 Conduit Street, for tubs for shrubs.

Messrs. Liberty, Regent Street, W., for terra-cotta vases, pergolas, and sundials.

Messrs. Lloyd Lawrence, 29 Worship Street, E.C., for Pennsylvania lawn mowers.

The Patent Ladder Co., Peterborough, for patent safety extension ladders.

Messrs. Ransomes, Sims & Jefferies, Ipswich, for lawn mowers.

Messrs. E. Westmacott, 150 Leadenhall Street, E.C., for "Cape Hermitage" wine.

Bronze Banksian Medal.

Messrs. D. Dowel, Hammersmith, for garden pottery and sundries.

Messrs. Fenlon, 8 Tudor Street, E.C., for heating apparatus, boilers.

Mr. James George, Putney, for peat, mushroom spawn, manures, &c.

Messrs. Headly & Edwards, Cambridge, for garden seats, weather vanes, tents, &c.

Messrs. W. Herbert, 2 Hop Exchange, S.E., for garden requisites.

Messrs. A. Shanks, Bush Lane House, E.C., for lawn mowers.

Messrs. T. J. Syer, 45 Wilson Street, E.C., for garden tools, ladders.

GENERAL MEETING.

JULY 21, 1908.

Mr. H. J. VEITCH, F.L.S., V.M.H., in the Chair.

*Fellows elected (87).—*Mrs. B. Abercromby, C. Andr  , Mrs. A. Arthur, Mrs. W. Babbie, H. Harper Baird, Mrs. A. Bamford, Mrs. Rayner, D. Batten, W. Bayliss, J.P., Miss G. Lowthian Bell, O. V. Bosanquet, Sir John F. H. Broadbent, Bart., M.D., W. Broomhall, Captain Sir Francis Burdett, Bart., Mrs. J. Burnet-Geake, Mrs. W. G. Busk, E. C  sar, Mrs. A. F. Chilver, A. C. Clauson, J. Howell Coles, W. Howard Collins, S. Ronayne Conron, Mrs. S. V. Dardier, A. J. Darlington, Mrs. Davey, Jules de Castro, Mrs. Devenish, C. R. Dickenson, Mrs. G. R. Z. Erskine, Mrs. A. Fair, T. R. Ferens, M.P., J. Hy. Fincham, Colonel H. S. Fitz-Gerald, C.B., Mrs. Foster, Mrs. Fowler, Mrs. Godwin-Austen, Sir D. F. Gooch, Bart., Mrs. Graves, Mrs. Gray, Hon. A. Ernest Guinness, Miss K. E. Halkett, G. Hamilton-Smith, T. Harding, Mrs. Harold, Hon. Mrs. Hodgson, R. H. Humphreys, E. Hutchinson, J. K. Ingram, Mrs. G. W. M. Johnstone, Julian Joseph, Mrs. W. King, J. Viner Leeder, Mrs. Lomax, C. J. Lomer, Miss E. S. Lomer, R. A. McCall, K.C., P. McEuen, A. Gibson McLagan, Mrs. Marten, G. Morgenstern, W. Neil, Mrs. H. R. Oldfield, E. C. Parslow, J. J. Peake, Miss M. Ridley, T. Robinson, G. H. Rose, Mrs. Sadler, Miss Schofield, J. C. Searle, W. H. Staff, Mrs. Bernard Stilwell, Miss Stimpson, Mrs. N. H. Stirling, Mrs. F. P. Stopford, The Countess Sztaray, Mrs. Tait, Mrs. T. M. Taylor, C. L. Colyn Thomson, A. Trevor-Battye, M.A., F.L.S., Mrs. Verelst, T. Riversdale Walrond, Hon. Mrs. Whateley, Mrs. Hetherington White, J. T. Willans, A. Williams, Frank Williams, Mrs. R. H. Williams.

Fellow resident abroad.—J. Rasteira (Portugal).

Associate.—H. D. King.

A lecture on "Annuals" was given by Mr. A. Watkins (see p. 179).

GENERAL MEETING.

AUGUST 4, 1908.

Mr. H. B. MAY in the Chair.

Fellows elected (18).—Mrs. P. P. Alexander, Miss Amy L. Buxton, R. Campbell, W. P. Collier, F. Wilson Dent, A. Fells, Mrs. F. Francis, Mrs. A. N. Heathcote, E. Holden, C. Jones, G. H. Parkinson, Hy. Parsons, Mrs. Reid, W. P. Rhodes, Sir Frederick Treves, Bart., G.C.V.O., C.B., LL.D., R. Howard Wall, Miss Weeding, J. Rennie Wilkinson, J.P.

Fellow resident abroad.—Professor K. Nakamura (Japan).

Society affiliated.—Royal Guernsey Horticultural Society.

GENERAL MEETING.

AUGUST 18, 1908.

Sir ALBERT ROLLIT, D.L., in the Chair.

Fellows elected (12).—R. W. Ascroft, E. J. M. Athier, Mrs. Bennett, Mrs. G. F. Beaumont, Miss H. M. Griffiths, Mrs. A. King, J. P. Mack, Mrs. W. H. Mills, F. G. L. Moir, Mrs. W. Morris, Miss Theologo, Randolph Wicke.

A lecture on "Cultivation of Cherries in Pots" was given by Mr. James Hudson, V.M.H. (see p. 189).

SCIENTIFIC COMMITTEE.

MAY 12, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, with ten members present, and Rev. A. R. Upcher, Visitor.

Malformed Narcissus.—Mr. Worsdell, F.L.S., reported that he had examined the malformed *Narcissus* 'J. T. Bennett-Poe' sent by Messrs. Hogg & Robertson, and found that the flower exhibited signs of fasciation, but this was only partial, since the perianth segments were only nine in number, as were the stamens; there were, however, two normal ovaries, each with its full complement of three carpels. The style was somewhat flattened, and springing from its base was a branch which was probably a second style. This had become petaloid and tubular, and in the tube thus formed a third style had developed.

Fasciation in Narcissus.—Mr. Odell sent flowers of *Narcissus* 'Emperor,' which had been produced after all the normal flowers in the bed had died off, and which were fasciated, some having flattened stems bearing at the apex three flowers, each on a separate pedicel, others having the fasciation carried farther, so that the flowers themselves were coherent.

Peloric Calceolaria.—Mr. Tysoe, Lodge Gardens, Bedford, sent flowers of *Calceolaria* showing regular peloria. All the flowers on the main branches of the inflorescences of two plants exhibited this phenomenon.

Primulas.—Mr. Douglas, V.M.H., showed on behalf of the Right Hon. the Earl of Waldegrave some flowers of the green Primrose, in which the corolla is virescent and the stamens are but imperfectly formed. Rev. A. R. Upcher, M.A., of Halesworth, Suffolk, showed a large number of flowers of *Polyanthus* of large size and much substance, and many with a very distinct eye. The calyx was large and very broadly campanulate in most of the flowers. Mr. Upcher had started some thirty years since with the old "butter" *Polyanthus*, and had pollinated this with pollen from *Primula sinensis* and *P. Auricula*; but although considerable variation in many directions was observable in the flowers shown, the committee did not consider that there was any evidence that the pollen of these species had had any effect in producing the results obtained. Some of the forms had fringed petals, and others smooth-edged petals, the petals in some were remarkably broad, the "eye" was well marked, and contrasted with the remainder of the corolla in some, while in others the deep colour was suffused over the whole of the petals. The collection showed in a marked manner the variation obtainable in *Polyanthus* through cultivation without the introduction of new blood. Mr. Bowles showed a number of flowers of *P. officinalis* from a wild source lacking the deep yellow spot which is usually to be found in the flowers

of this species. He asked that others would make observations in order to note whether this was a common phenomenon or not.

Seakale disease.—Mr. Güssow showed a specimen of Seakale which had become rotten, one of a considerable number in a plantation in Norfolk, which he said had been attacked by a bacillus, at present undescribed, differing in certain characters from *Pseudomonas campestris*. He considered that the attack of the organism upon the Seakale had been made possible by the methods adopted in forcing it, and that the attack might have been prevented if air had been admitted by raising the Seakale pots somewhat above the soil level.

Intumescence in Brugmansia.—Mr. Saunders, F.L.S., showed a leaf of *Brugmansia* exhibiting small warty growths, somewhat resembling intumescences, a condition brought about usually by lack of a proper balance between the amount of water supplied at the roots and the humidity of the air, and a proper regulation of temperature.

Amaryllis sp.—Mr. Elwes, F.R.S., showed a plant apparently allied to *Amaryllis solandraeflorum*, but having a rose suffusion upon the perianth. The flowers are of very elegant form, and the plant appears to be rarely seen in this country.

Moraea iridioides var. *Johnsonii*.—Mrs. Richmond, Woodlands, Lustleigh, South Devon, sent a flower and leaf of the very beautiful variety *Johnsonii* of *Moraea iridioides*. The flowers are considerably larger than those of the type or the variety *Macleayi*, and the foliage is upright instead of being fan-shaped; the bud was picked on May 7, and the flower was still almost perfect on the 12th inst. The seed from which the plant originated was brought by a lady (Mrs. Johnson) from the mountains of Ceylon, where it had probably been originally taken from South Africa.

SCIENTIFIC COMMITTEE, JUNE 9, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the chair, and fourteen members present.

Brugmansia leaves injured.—Mr. Güssow reported that he had examined the leaves of *Brugmansia* shown at the last meeting by Mr. Saunders, and found that they had been injured by some insect which had punctured the leaf, and around this puncture corky cells had developed.

Malformed Orchids.—Mr. Worsdell, F.L.S., reported that he had examined a specimen of *Cattleya intermedia* referred to him, in which three flowers had become fused together so that there were eighteen perianth pieces in the resulting fasciated specimen and three properly formed columns. The ovaries, however, were completely absent. Mr. Gurney Wilson, Haywards Heath, sent flowers of *Odontoglossum crispum* which were referred to Mr. Worsdell (see p. cxiii).

Oxalis bupleurifolia.—Mr. Hales showed the interesting *Oxalis bupleurifolia*, a Brazilian species with small yellow flowers, having the petioles developed into phyllodes, which are remarkable in being placed horizontally instead of vertically, as in most plants possessing phyllodes.

In several cases the phyllodes possessed at their tips the three leaflets normal in species of *Oxalis*, though occasionally the terminal one was represented only by a small linear outgrowth, and sometimes all were absent. These leaves are sensitive to contact. The plant grows in shady woods in Brazil, which probably accounts for the horizontal position of the phyllodes.

Malformed Streptocarpus.—Mr. Odell showed very fine flowers of *Streptocarpus* having in some cases two linear petaloid outgrowths arising between the calyx and the corolla on the dorsal side of the flower, in others stamens were produced in this position. Mr. Odell found that the later produced flowers bore stamens, while the first flowers had the petaloid outgrowths. He had seen similar growths in *Gloxinia*, and in the present case he removed the first developed flowers as soon as the petaloid outgrowths were noticed, and the flowers next produced developed stamens in the position occupied by the outgrowths in the first produced flowers.

Rosa lutea.—In June 1906, Mr. A. W. Sutton, V.M.H., showed dried specimens of a yellow Rose which had been named at Kew *Rosa Eglanteria* (= *R. lutea*) from Baalbec. Mr. Sutton subsequently obtained through a lady missionary at Baalbec some fruits and shoots of this Rose, but they were dead when they arrived. Later, however, he received other seeds, from which three plants had been reared, and which were now flowering in his garden. He exhibited a flower of a beautiful clear yellow colour, measuring 3 inches in diameter. A full account of the history of this plant, which Colonel Prain thought when he saw the dried specimens from Baalbec to be identical with the Indian *Rosa Eglanteria*, is given in the *Gardeners' Chronicle*, July 1906, p. 1.

Yellow stripe in Daffodils.—Specimens of this well-known disease were received, and some discussion took place concerning it. Various members of the Committee detailed their experiences concerning it, and regarded as contributory causes the use of fresh manure, late planting, and too wet a soil. The precise primary cause is at present unknown, but, as Mr. Darlington suggested in his lecture at the general meeting, imperfect root action may be a cause, but whether primary or secondary is not clear (see p. 161).

Abnormal Daisy.—Mr. A. W. Sutton showed an abnormal Daisy having the head inverted so that the florets pointed downwards instead of upwards as in the normal inflorescence, while the stalk passed completely through the centre of the head and was attached at the upper side where there were the usual bracts forming the involucre, but in this case occupying the upper portion of the inflorescence.

SCIENTIFIC COMMITTEE, JUNE 23, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the chair, with fourteen members present, and Prof. Hansen, of Dakota, U.S.A., and Mr. Scrase-Dickins, visitors.

Cherries eaten.—It was reported that the holes in the fruits of Cherry which were received from Sir Robert Harvey were due to the feeding of the larvæ of winter moths.

Malformed Odontoglossums.—Mr. Worsdell, F.L.S., reported that one of the flowers of *Odontoglossum crispum* received from G. Wilson, Esq., F.R.H.S., of Haywards Heath, had the three stamens of the outer whorl all developed, instead of only one as is usual. The second flower had a normal column and normal sepals, but each of the three petals had become partly modified into stamens and bore anthers.

Dodder.—Mr. Güssow showed photographs of *Cuscuta Trifolii* attacking Clover and Kohl-rabi, and of *C. chilensis* growing upon Lucerne, Kohl-rabi, Rye-grass, and red and white Clover. Dr. Voelcker said that experiments had been tried with Chilian Clover seed containing Dodder, and it had been found that though the Dodder had germinated and grown upon the Clover in the first year, in the second none had been found, as it had failed to form seed. Mr. Güssow, however, thought that seed was produced at least under certain circumstances.

Lily hybrids.—Mr. Scrase-Dickins, F.R.H.S., showed seedlings of *Lilium croceum* \times *L. elegans* and *L. van Houttei*. The plants showed extraordinary vigour, which the raiser attributed partly to the fact that they were seedlings, and partly to their hybrid origin. The hybrids do not set seed when pollinated with one another's pollen, but set seed freely when pollinated with pollen from *L. elegans*. The forms varied considerably among themselves, and forms of *L. dahuricum* could be well matched among them. The *L. elegans* parentage was evident in many by the reflexing of the perianth pieces. Unfortunately the hybrids are not disease-resisting. A hearty vote of thanks was accorded to Mr. Scrase-Dickins.

Effect of ammonium salts on flora.—Dr. Voelcker showed a fern which had developed under curious circumstances. A series of drain pipes filled with soil and each covered at the base with a perforated slate, below which a glass funnel had been fixed in order to catch the drainage water, had been kept for two years, during which time through some ammonium sulphate had been passed, through others ammonium chloride, others, nitrate of soda, and others, distilled water. The ferns had grown through the perforation of the slate into the funnel (which was exposed to light), only in those cases where ammonium salts had been passed through the soil. This was apparently due to a difference in the reaction of the soil in the different cases. It had been noted that continued manuring of the soil with ammonium salts finally resulted in a sterile condition, and before that the appearance of certain algæ upon the soil different from those found under other circumstances. This sterility can be overcome by the addition of lime to the soil, and in cases where only a small bulk of soil is in use, by stirring the soil up with distilled water and allowing it to settle.

Phlox leaves malformed.—Mr. Worsdell, F.L.S., drew attention to the peculiar form at times assumed by the leaves of Phlox. Sometimes the leaves appeared as ascidia or as pockets, or merely as wings on the midrib. This condition, Mr. Massee, V.M.H., pointed out, was due to the presence of the eelworm *Tylenchus devastatrix*, large numbers of which were present in the plants. This and other species of eelworm were responsible for many malformations in plants, as is seen in the Tulip-rooted Oat, the thickened neck of the Onion, malformed flowers in

cereals and various wild grasses (in one case of *Agrostis vulgaris*, a malformation due to an eelworm has been taken as a character upon which to found a variety), and warts and knob upon roots.

Arisaema consanguineum.—Mr. Masee, on behalf of Mr. Elwes, F.R.S., showed plants of this new species.

Plant-breeding.—Professor Hansen, of N. Dakota, who is passing through London on his way to Russia and Siberia on his fourth journey of exploration, received a hearty welcome from the Committee. In the course of his remarks he alluded to the efforts which were being made to obtain fruit trees which would maintain their existence without coddling through the rigours of the American winter, and remarked upon the great measure of success which had already attended their efforts to obtain frost-resistant Plums, Raspberries, &c.

Fruits of Lathraea clandestina.—Mr. Bowles showed capsules of this interesting and beautiful parasite to illustrate the explosive mechanism by which the seeds are flung out of the capsule when ripe. The two valves of the capsule suddenly roll inwards and fling the seeds out a very considerable distance.

Primula angustidens.—From Messrs. Veitch, Chelsea, came a pan of this beautiful *Primula*, which is closely allied to *P. Poissonii*, and bears several whorls of drooping deep clear purple flowers upon its rigid erect stems.

Miltonia vexillaria.—Baron Schröder, V.M.H., sent a spike of *Miltonia vexillaria* with normal flowers, and another with partially double flowers, which was borne upon a plant divided from the former a few years ago. The parent had always (for over twenty years) borne normal flowers, while each year since its separation the offset had produced semi-double flowers.

Blue Sweet Pea 'Zephyr'.—From Mrs. R. H. Biffen, Histon, came flowers of a Pea raised by crossing 'Zoë' (a medium blue) with a 'Countess Spencer' (Paradise) in 1905. Mrs. Biffen had obtained the same thing from a number of crosses made subsequently between flowers of a deep blue and others of a pink colour, in addition to others of all shades of blue and of the 'Spencer' form.

Culinary Peas.—Mr. A. W. Sutton, V.M.H., showed the offspring of a Pea occurring spontaneously in Palestine, twelve miles from Jaffa, four years ago. Many hybrids have been raised from crosses between this wild form and the best of the cultivated ones, and in some the coloured flower is reproduced, in others the flowers are white; in some the serrated edges of the foliage, normal in the wild plant, are retained, but in others the margin of the leaf is practically entire.

SCIENTIFIC COMMITTEE, JULY 21, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and eight members present.

Peloric Pansy.—Mr. Hales exhibited flowers of Pansy showing regular peloria. Many had but four petals, others had five, and each petal was spurred. Only one plant out of a batch of seedlings had

exhibited this phenomenon, which appears to be very rare in the Pansy, though well known in *Linaria* &c.

Myosotis.—Mr. Bowles exhibited an inflorescence of the common Forget-me-not from the plant which he showed last year, and which then had the calyx much enlarged; this year, however, the calyx was of normal size.

Cypripedium with double lip.—From H. J. Allwood, Esq., of Acocks Green, came a specimen of *Cypripedium Lawrenceanum*, normal in all respects except in the labellum, which was double, as though it had been cleft deeply in its very early stages of growth. This, and a curious form of *Cattleya Harrisonii*, were handed to Mr. Worsdell for further examination.

Blue Sweet Peas.—Mrs. Biffen, Histon, Cambridge, sent specimens illustrating blue forms of the 'Spencer' type of Sweet Pea, together with an account of their pedigree:—

"The various blue shades of waved Peas have resulted from crosses between 'Zoe,' a medium blue Pea, and 'Paradise,' 'John Ingman,' and an unnamed rose-coloured variety practically identical with the original 'Countess Spencer.' A similar series as far as colour goes, but less waved, has been given by a cross between 'Zoe' and 'Gladys Unwin.' 'Navy Blue' crossed with 'Paradise' has also given the same series, and it is probable that any shade of pink or deep rose and 'Navy Blue' would also give them. In each case the first generation was a deep purple blue with deep blue wings. The selfed seeds from these purple hybrids ('Zoe' \times 'John Ingman') gave a rather complex generation consisting of bronzo-purple, purple with blue-purple wings, navy blue, 'Zoe' blue, 'Zephyr' blue, pale blue, lavender (probably 'Mrs. C. Foster'), 'John Ingman' colour, deep rose, pale rose (various shades of), tinged white. These various colours were present in both flat and waved forms, and farther as flakes on a white ground. The cultures raised were not sufficiently large to give reliable statistics, so the figures are not quoted here.

"The behaviour of each of the types mentioned has been traced in some detail, but attention is only called here to the blue shades. Anyone who has grown the mixtures known as 'Prince of Asturias,' 'Rosie Adams,' 'The Marquis,' 'Silas Cole,' &c., can readily trace the genetic constitution of the heterozygous purples, whilst the pink and rose shades behaved much as the first stocks of 'Countess Spencer.' It should be noted, though, that each of these purples can apparently be obtained in a fixed form.

"The various blue shades either bred true to type or yielded a series of 'sports' in definite proportions. The analysis of the whole set of statistics has not been completed yet, but the colours are given in the order of their frequency.

"*Zoë shade*.—(1) Breaks into 'Zoë,' navy, 'Zephyr,' bluish pink, pale blue, and pale pink. (2) Gives the blue series just mentioned and no pinks. (3) Breeds true ('Zoë,' 'Countess' form of, specimens exhibited).

"*Navy shade*.—(1) Breaks into navy, 'Zephyr,' and the same two pink shades as the above. (2) Gives navy and 'Zephyr.' (3) Breeds true (specimens exhibited).

- "*Zephyr shade*.—(1) Breaks into 'Zephyr' and pale pink only.
 (2) Breeds true (specimens exhibited).
 "*Pale blue*.—(1) ? throws 'Zephyr' (no case yet met with).
 (2) Breeds true (specimens exhibited).

"The 'Spencer,' the 'Unwin,' and the flat standard types all behave in the same fashion, and what evidence has been obtained at present shows that the corresponding flaked colours give the same results. A few of the flaked types were exhibited for comparison with the whole colours. It should be noted that flaking is not visible in either parent. When it appears it has always acted as a simple recessive to the corresponding whole colour. Thus a deep purple flake might split into purple, blue, and pink types, but each would be flaked and no self colours would occur.

"It is rather a curious fact that whilst a long series of pinks, orange, white and yellow shades are known in a fixed condition, no waved blues have yet appeared in commerce with the exceptions of 'Mrs. C. Foster.' This latter is heterozygous, and may be left out of account. It would seem to point to the fact that the 'Spencer' forms are not so readily cross-fertilised by bees as is generally stated. If they were so we might fairly expect that the blue shades would be as well, or, knowing the partiality of bees for blue flowers, better represented than the pinks."

SCIENTIFIC COMMITTEE, AUGUST 4, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and ten members present.

"*Black-eye*" of *Carnations*, &c.—Mr. Massee, V.M.H., showed flowers of various species of *Dianthus*, including Carnations, affected by the fungus *Ustilago violacea*, which develops its spores in the anthers of different species of *Caryophyllaceae*. The fungus is common on wild plants belonging to the order, but is less common on cultivated plants. The mycelium is perennial in the tissues of its host, and therefore it is useless to attempt a cure; affected plants are best destroyed. The host plants can only be attacked when in the seedling stage or in the young shoots, and nothing can be seen of the fungal attack until the fruiting stage is reached in the anthers of the host. It is then known by the blackish dusty mass of spores in the centre of the flower.

An uncommon fungus.—Mr. Holmes, F.L.S., showed numerous specimens of the curious saprophytic fungus *Geaster Bryantii*, which had occurred in a dry border recently manured with farmyard manure in his garden at Sevenoaks.

Listrostachys forcipata.—Mr. Douglas, V.M.H., showed a plant of this rare and beautiful little Orchid, bearing several of its curious delicate white flowers, the perianth of which is apparently but one cell in thickness. The plant is a native of dense forests in Buea, Cameroons, at an elevation of 4,200 feet (see Kränzl in *Engl. Jahrb.* xix. 254; and Rolfe in *Fl. Trop. Afr.* vii. p. 168). A Botanical Certificate was unanimously recommended for this plant.

"Wheat-ear" *Lychnis alba*, &c.—Mr. Fraser, F.L.S., showed specimens of this plant, having the bracts usually below the flower repeated

again and again, the flowers themselves being almost aborted, the sepals being much laciniated. Similar peculiarities are produced in certain plants through the attacks of eelworm. Mr. Bowles, M.A., showed a similar peculiarity in *Dianthus superbus*, the plant bearing the inflorescence having been taken from a plant showing the same peculiarity exhibited by Canon Ellacombe last year.

Sweet Peas dying.—Mr. Fraser also showed Sweet Peas with prematurely yellowed foliage. The root had been attacked by the fungus *Thielavia basicola*, a species which is apparently very common this year.

Salix undulata.—Mr. Fraser also showed two specimens of willow shoots cut from the same bush at different periods in the year. In April the ovary was completely glabrous; but by August the ovary had become pubescent—a character typical of *S. undulata*.

Variation in plants.—Mr. Shea made some observations upon this subject, exhibiting variegated leaves of a Sunflower. Last season one side (that towards the magnetic north pole) had shown variegated leaves, the remainder of the foliage being normal. He had saved seeds from that side of the inflorescence, and the seedlings were weaker and bore variegated leaves throughout, while seeds from other parts of the inflorescence produced normal plants. Mr. Shea said that he had observed in other cases that variation had been confined entirely to the side of the plant towards the magnetic north pole.

Variation in Delphinium 'Carmine Queen.'—From Messrs. Veitch, Chelsea, came inflorescences of this Delphinium showing some flowers of a beautiful violet-blue, others of a pinkish tinge, and others again streaked and splashed with both colours. All the flowers of some shoots were of one colour, in others the two colours were restricted to separate flowers, and in others the whole of the flowers were of both colours intermingled. It was noticeable that there were no intermediate shades of colour.

Varieties of Epilobium hirsutum.—Mr. Bowles showed specimens of the normal form of *E. hirsutum*, a very hairy form, with flowers of a deeper colour, from South Europe, a form with white petals and rosy stamens, a form with white petals and stamens (the ovary, however, showed the usual red tinge), and a virescent form.

Ants and aphides.—The following communication was received from the Rev. H. E. Bishop, M.A., Middleton Vicarage, King's Lynn: "Some Gooseberry bushes are trained on a north wall in my garden. During the wet weather I noticed that many shoots were encrusted with sand and lime (somewhat in the manner of the case of a caddis worm), and on breaking this away we were surprised to find the shoot covered with aphides and the ants busy among them. After examination we came to the conclusion that the ants had constructed the cases to prevent the aphides being washed away by the rain. The piece broken away was repaired the next day. The upper leaves seemed to serve as a roof, and the sand built round left a clear passage way round the aphides. Since the settled fine weather the casings have been completely cleared away." Mr. Chittenden observed that he had seen a similar thing in a greenhouse, where the ants constructed a covering over aphides on the stem of a *Cineraria*.

SCIENTIFIC COMMITTEE, AUGUST 18, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and eleven members present.

Aliens in garden soil.—Mr. Fraser, F.L.S., showed a specimen of the alien weed, *Amaranthus retroflexus*, a North American plant which had appeared in a garden at Kew, though no seeds or plants had been received from North America and planted in the garden. He thought that the plant had possibly arisen from a seed introduced with merchandise either from North America or from the Continent, where also the plant has become a weed. He has noticed other instances of plants which had probably been introduced in a similar way, and had become weeds in gardens, viz., *Datura Stramonium*, *Euphorbia Esula*, and *Sisyrinchium angustifolium*, while *Papaver somniferum*, *Oenothera biennis grandiflora*, and *Oxalis corniculata rubra*, originally cultivated, had quite frequently become garden casuals, and certain British wild plants, e.g. *Chenopodium rubrum*, *Epilobium roseum*, *E. hirsutum*, *Lychnis alba*, and *Silene Cucubalus* often behaved in a similar fashion.

Rubus laciniatus.—Mr. Fraser also showed a specimen of a seedling form of *Rubus laciniatus* which he had collected on West End Common, Esher, where the seed had been deposited in all probability by a bird. The origin of this form appeared doubtful, but it seemed to differ only in the lacinated leaves (the sepals and petals also being cut) from *Rubus villicaulis* var. *Selmeri*.

Rose canker.—Mr. Güssow showed specimens of a disease of Roses which was very prevalent in Ireland, and which started in the form of reddish spots on the shoots. These spots soon died, the dead tissue contracting and cracking. A callus formed around the edges of the wound, and this was frequently damaged by frost, &c., until a large cankerous growth was produced. He attributed the beginning of the injury to the fungus *Coniothyrium Fuckelii* Sacc., the conidial form of *Leptosphaeria Coniothyrium* (see p. 222).

Double Genista tinctoria.—Mr. Bowles showed specimens of double flowers of *Genista tinctoria* from Canon Ellacombe's garden, and others having numbers of bracts below the inflorescence. This had apparently arisen from the presence of a small dipterous larva belonging to the *Cecidiomyidae*, which Mr. Saunders, F.L.S., reported as that of *Aspondylia genistae*. This species is known to attack and form galls on the ends of the shoots of *Genista germanica* in exactly the same manner as in the shoots exhibited. Another species, *A. ulicis*, forms galls resembling flower-buds on *U. europaeus*. There appears to be no record of *G. tinctoria* being galled by a fly, but some of the galls in the present specimens contained no less than fifteen or twenty grubs feeding upon the leaves forming the gall, particularly at their base.

Abnormal Orchid.—From Messrs. Hugh Low came an Orchid, *Rodriguezia crispa*, showing an abnormal condition in the spike; the bracts were much longer than the flowers, and very closely grouped at the end of the inflorescence.

Mutations in Shirley Poppies.—Mr. Chittenden showed, on behalf of a correspondent, a number of dried flowers of the Shirley Poppy, all of which had bracts just under the flower or where the flowers should be, some two, others three, four, five, or six bracts without flowers; while others produce bracts with semi-double or quite double flowers. Neither the Rev. W. Wilks nor any other member of the Committee had seen bracteate flowers in this plant. It would be interesting to know what was the origin of the seed, and whether the peculiarity came true from seed.

Fern growing in bottle.—Mr. Drury, V.M.H., exhibited in a pickle jar, sealed with a glass and rubber stopper, wired on to prevent removal, a mass of vegetation consisting of a *Scolopendrium*, two *Lastraeas*, and a dense tangle of confervoid growth, the whole of which had arisen from a small piece of the base of a Hart's-tongue frond, bearing a minute bud, which had been placed in the jar fully four years ago, and the spores and animal eggs, &c., which had gained entrance with it at the time when it was sealed and secured. About an inch of clean-washed coarse silver sand was first introduced, and upon the damp surface the base and bud in question were simply dropped. The jar is about 8 inches high and 3 inches square, and from the commencement the growth has been healthy, the fronds of the Hart's-tongue Fern reaching the stopper, while the confervoid growth is dense in the centre, and has spread half-way up the sides. The two seedling *Lastraeas* have remained small, but have produced new fronds this season, while several healthy green fronds of the Hart's-tongue spring from the centre from amid the débris of the old ones of the three previous years' growths. The question raised by this exhibit is, Whence has the material for all this growth been derived? The originally enclosed air could only have contained a three-thousandth part of carbonic acid gas, *i.e.* a minute atom of carbon, altogether out of proportion to the débris of dead fronds and the volume of cellular growth of the living ones which have been generated in the jar since it was closed four years ago. If it be assumed that the glass is porous, and thus permits air circulation, and consequent fresh supplies of carbonic acid gas by the law of gas diffusion, how is it that aqueous vapour has not also been transferred, and the quantity of water reduced during so long a period to nothing? Carbonic acid, too, is not the only food required, and the amount of assimilable salts contained in well-washed quartz sand, freed from all vegetable admixture by such washing, save perhaps confervae or other spores, can hardly be regarded as adequate for such results, and for persistent growth, such as is shown. A small worm has also been noticed inside the jar. While expressing interest in the experiment, the members of the Committee greatly doubted whether the bottle was really hermetically sealed.

FLORAL COMMITTEE.

MAY 12, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Gold Medal.

To Messrs. May, Edmonton, for hardy ferns.

Silver-gilt Flora Medal.

To Mr. J. Douglas, V.M.H., Great Bookham, for Auriculas.

To Mr. G. Mount, Canterbury, for Roses.

To Messrs. J. Veitch, Chelsea, for greenhouse plants and flowering shrubs.

Silver-gilt Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations, Roses, &c.

Silver Flora Medal.

To Messrs. Bunyard, Maidstone, for herbaceous plants.

To Messrs. Cannell, Swanley, for Hydrangeas, Pelargoniums, &c.

To Messrs. Cutbush, Highgate, for greenhouse plants.

To Messrs. W. Paul, Waltham Cross, for Roses.

To Messrs. Peed, Streatham, for Gloxinias and Japanese Maples.

To Mr. Prichard, Christchurch, for alpinas, &c.

To Messrs. T. Rochford, Broxbourne, for Roses.

Silver Banksian Medal.

To Mr. Burnett, Guernsey, for Carnations.

To Mr. R. Gill, Falmouth, for Rhododendrons, &c.

To Messrs. Carter, Page, London Wall, for Violas.

To Mr. W. H. Page, Hampton, for Carnations.

To Mr. L. R. Russell, Richmond, for flowering shrubs.

To Mr. C. F. Waters, Balcombe, for Carnations.

Bronze Flora Medal.

To Messrs. Dobbie, Rothesay, for Violas and Polyanthus.

Bronze Banksian Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. R. and G. Cuthbert, Southgate, for Azaleas.

To the Misses Hopkins, Shepperton, for alpinas.

To Messrs. G. Paul, Cheshunt, for flowering shrubs, &c.

To Mr. Reuthe, Keston, for Alpinas, Rhododendrons, &c.

To Mr. C. Turner, Slough, for Violas, &c.

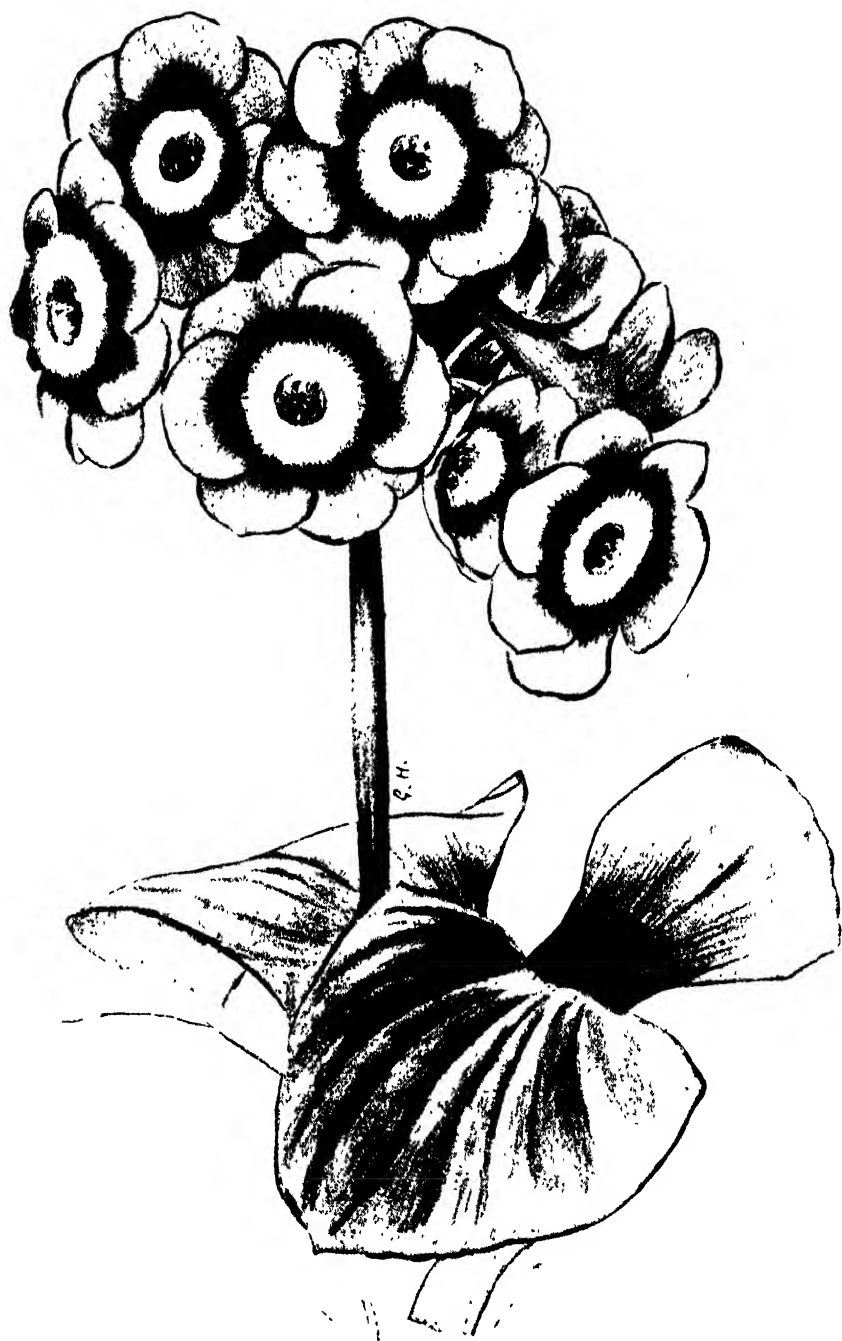


FIG. 41.—AURICULA 'MILDRED JAY.' (*The Garden.*)

Award of Merit.

To *Asparagus filicinus* (votes, unanimous), from Sir Trevor Lawrence, Bart., Burford (gr. Mr. Bain). A species from the temperate and tropical Himalaya, of tall, erect growth, with the main branches spreading horizontally and clothed in a curiously frond-like manner with the small 2-5-branched, flat, falcate cladodes. Flowers small, greenish, on slender pendulous pedicels about an inch in length, generally in pairs.

To *Aubrietia* 'Paul's Pink' (votes, 15 for, 6 against), from Messrs. G. Paul, Cheshunt. Habit good, floriferous; colour rosy-pink, very similar to that of 'Souvenir de W. Ingram.'

To *Auricula* 'Coronet' (votes, 14 for, 3 against), from Mr. J. Douglas, V.M.H., Great Bookham. A green-edged variety, flowers of good size and substance, but with not very flat pips.

To *Auricula* 'May Day' (votes, 14 for, 7 against), from Mr. Douglas. A yellow self, flowers very full, round and flat, $1\frac{1}{2}$ inches in diameter; pale yellow, paste white; truss good.

To *Auricula* 'Mildred Jay' (votes, unanimous), from Mr. Douglas. An alpine variety with flowers $1\frac{3}{4}$ inches in diameter, very full, round and flat; ground colour rich purple with broad edge of pale purplish-lilac; paste pale sulphur-yellow. (Fig. 41.)

Other Exhibits.

Messrs. Barr, Covent Garden: alpinas, &c.

Mr. F. Boston, Cliftonville, Northampton: Polyanthus.

Messrs. Box, West Wickham: alpinas and Begonias.

Messrs. Bull, Chelsea: stove foliage plants.

Mrs. Burns, North Mymms Park: white Hippeastrums.

Messrs. Cheal, Crawley: flowering trees and shrubs.

Messrs. Clark, Dover: alpinas, &c.

W. B. Craig, Esq., Ivybridge, South Devon (gr. Mr. Swan): Roses.

H. J. Elwes, Esq., Colesborne: Fritillarias, &c.

Messrs. Heath, Cheltenham: alpinas.

Mrs. Hensley, Farnham: floral studies.

Lady Hindlip, Worcester: Sweet Peas.

Mary, Countess of Ilchester, Holland House: *Lopezia* and *Petraea*.

Misses Kipping, Hutton: alpinas.

Mr. S. J. Martin, Menai Bridge: *Pelargonium* 'Perfection.'

Mr. S. Mortimer, Farnham: Polyanthus.

Mr. F. J. Patmore, Lymington: Violas.

Mr. Amos Perry, Enfield: herbaceous plants.

Messrs. Phillips and Taylor, Bracknell: Auriculas and alpinas.

Mr. G. Prince, Longworth: Rose 'Lady Violet Henderson.'

Rev. Roland Upcher, Halesworth, Suffolk: Polyanthus.

Mr. A. R. Upton, Guildford: alpinas, &c.

Messrs. Ware, Feltham: herbaceous plants.

Mr. W. A. Watts, St. Asaph: Polyanthus.

Mr. W. H. Young, Romford: Coleus.

FLORAL COMMITTEE, MAY 26, 1908, AT THE INNER TEMPLE GARDENS.
Mr. W. MARSHALL, V.M.H., in the Chair, and nineteen members present.

[For Medals and Cups awarded by the Council see p. xciv.]

Awards Recommended :—

First Class Certificate.

To *Dracaena Doucetti* var. *de Grootei* (votes, 10 for, 2 against),
from Messrs. Veitch, Chelsea. A very handsome variety of *Cordyline*

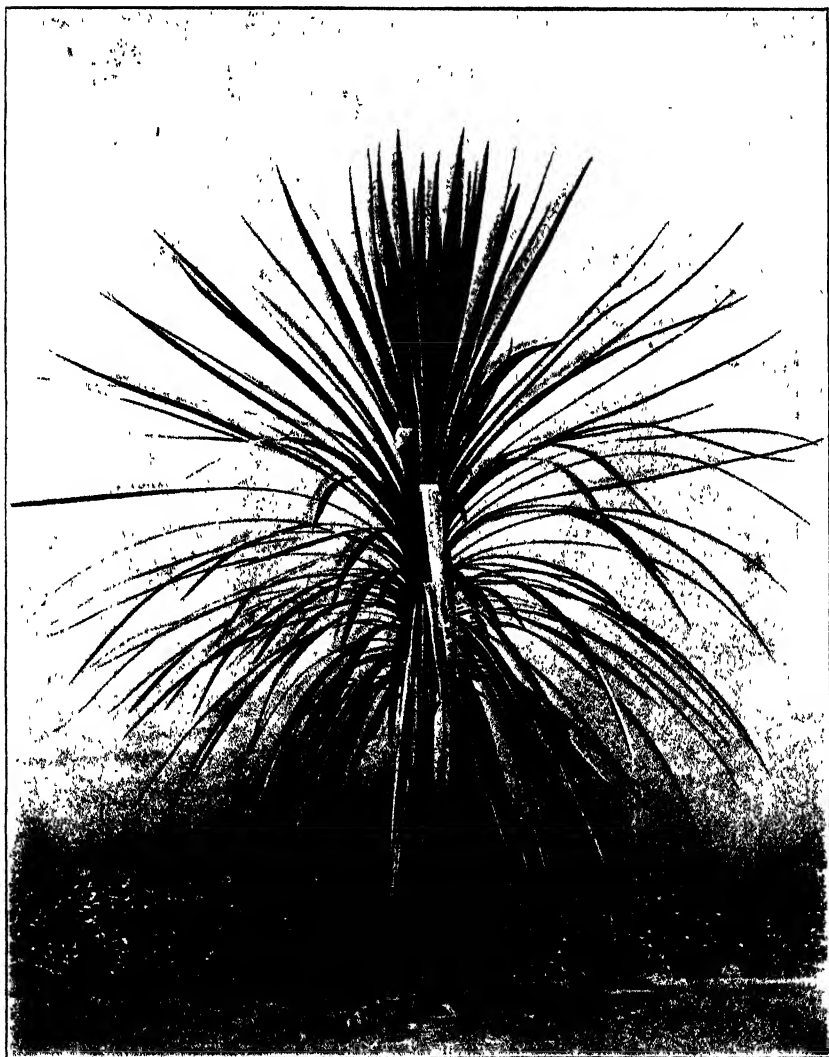


FIG. 42.—*DRACAENA DOUCETTI*, VAR. *DE GROOTEI*. (Veitch.)

(=*Dracaena*) *australis*. Young leaves stiffly erect, gradually arching
with age, 2-3 feet long and about an inch broad. Leaf-base and midrib

red ; leaf-edge broadly banded with yellow. A bolder and more distinct plant than *Dracaena Doucetti*, which received a First Class Certificate in 1889. (Fig. 42.)



FIG. 43.—*DIMORPHOTHECA AUBANTIACA*. (*Journal of Horticulture*.)

To Tulip 'Walter T. Ware' (votes, 19 for), from Messrs. W. T. Ware, Bath. A rich deep yellow self May-flowering variety which received an Award of Merit in 1907. Its proved lasting qualities, substance of petal and depth of colour now win for it the higher award.



FIG. 44.—ROSE 'LAURENCEON', (Gardener's Chronicle.)

(To face page xxxv.)

red ; leaf-edge broadly banded with y
plant than *Dracaena Doucetti*, whic
in 1889. (Fig. 42.)

more distinct
Certificate



Award of Merit.

To *Begonia* 'Empress Marie' (votes, unanimous), from Messrs. Blackmore and Langdon, Bath. A tuberous-rooted variety bearing very large double pure white flowers, with broad, round, smooth, very regular petals.

To *Codiaeum* (Croton) 'Fred Sander' (votes, unanimous), from Messrs. Sander, St. Albans. Leaves broad, three-lobed, halberd-shaped; yellow at the base, edged and tipped with green in the upper half; leaf-stalks and stems pale yellow.

To *Dimorphothea aurantiaca* (votes, unanimous), from Messrs. Barr, Covent Garden. A half-hardy annual from South Africa. Flowers about 8 inches in diameter, rich orange with a narrow deep-purple band surrounding the blackish-purple disc. Leaves fleshy, oblong, sinuate-toothed. This species was grown in the open at Wisley in 1907 and proved exceptionally showy and floriferous. Height 1 foot. (Fig. 43.)

To *Paeonia decora alba* (votes, unanimous), from Messrs. Wallace, Colchester. Flowers 4-5 inches in diameter, cup-shaped; petals 8, delicate blush-white becoming white. Stigmas red, surrounded by a mass of bright yellow stamens. Foliage glaucous green. Height 2-3 feet.

To *Rhododendron occidentale* (= *Azalea occidentalis*) var. *graciosa* (votes, 9 for, 1 against), from Messrs. Cuthbert, Southgate. Flowers about 2½ inches in diameter, borne freely in rather loose trusses of twenty or more; at first shaded with pale yellow, becoming white, and finally suffusing with pink especially at the edges and tips; blotched above the nectary with orange-yellow; crenate-waved at the margin, scented, appearing with the leaves. Height 2-6 feet.

To Rose 'Elaine' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. An exhibition hybrid tea rose. Flowers white, shaded in the bud with flesh-colour, of great substance and fine form; the bud long-pointed and the outer petals recurved.

To Rose 'Tausendschön' (votes, unanimous), from Messrs. Hobbies, Dereham, and W. Paul, Waltham Cross. A large-flowered Rambler with the foliage and strong shoots of 'Crimson Rambler,' and of bolder habit than Dorothy Perkins and other *Wichuraiana* hybrids. Flowers 2-8 inches across, thinly double, rich pink to pale pink, scarcely scented, borne freely in large trusses at the ends of the almost thornless shoots. (Fig. 44.)

To Rose 'White Dorothy' (votes, unanimous), from Messrs. Ben Cant, Colchester. A sport from 'Dorothy Perkins' with the habit, form and freedom of that Rambler but with white flowers, tinted in the bud with flesh-colour.

To Tulip 'Duchess of Westminster' (votes, 6 for, 3 against), from Messrs. A. Dickson, Belfast. A breeder tulip of the best Darwin size and form, outside rose-red in colour, edged, within almost scarlet; the base yellow touched with olive; stalks strong.

Other Exhibits.

Messrs. Artindale, Sheffield: alpines, &c.

E. Ascherson, Esq., Pett Place, Charing: Calceolarias, &c.

Messrs. Backhouse, York: alpines.

- Lady Bramston, Wimbledon : *Strelitzia regina*.
 Messrs. Brown, Stamford : flowering plants.
 Hon. Mrs. Cecil, Eaton Place : *Gloriosa lutea*.
 Mr. Chaplin, Waltham Cross : Petunias.
 Messrs. Clark, Dover : alpinas, herbaceous plants, &c.
 Mr. J. Douglas, V.M.H., Great Bookham : Auriculas.
 Messrs. Eggett, Thames Ditton : hardy ferns.
 Mr. C. Engelmann, Saffron Walden : Carnations.
 Mr. J. Forbes, Hawick : Pentstemons, &c.
 Messrs. Garaway, Bristol : Schizanthus.
 Messrs. Gilbert, Bourne, Lincs : Anemones, &c.
 Mr. Godfrey, Exmouth : Poppies, Pelargoniums, &c.
 Messrs. Gunn, Olton : Phloxes.
 Messrs. Heath, Cheltenham : Pelargoniums.
 Mr. C. H. Herbert, Acocks Green : Pink 'Progress.'
 Messrs. Jarman, Chard : Centaureas.
 E. J. Johnstone, Esq., Groombridge : Carnations.
 Messrs. Kelway, Langport : Paeonies.
 Messrs. E. W. King, Coggeshall : Sweet Peas.
 Misses Kipping, Hutton, Essex : alpinas.
 Mr. W. H. Lancashire, Guernsey : Carnations.
 Messrs. Lane, Berkhamsted : Rhododendrons.
 Messrs. A. Lister, Rothesay : Pansies.
 Mr. N. Lewis, Bridgwater : Anemones.
 Hon. A. H. T. de Montmorency, M.D., Carrickmines, Dublin : Tulips.
 Mr. S. Mortimer, Farnham : Carnations.
 W. Noakes, Esq., Croydon : Calceolarias.
 Messrs. Carter, Page, London Wall : Dahlias, Fuchsias, &c.
 Messrs. Pope, King's Norton : Clematis.
 Mr. H. C. Pulham, Elsenham : shrubs.
 Messrs. Beamsbottom, Alderborough, King's Co. : Anemones.
 Mrs. Richmond, Lustleigh, South Devon : *Moraea iridioides* var. *Johnsonii*.
 Messrs. Rogers, Bassett, Southampton : Rhododendrons, &c.
 Mr. V. Slade, Taunton : Pelargoniums.
 Messrs. Stark, Great Ryburgh : Sweet Peas.
 Studley Horticultural College : Gloxinias, &c.
 Swanley Horticultural College : Schizanthus.
 Mr. R. Sydenham, Birmingham : Sweet Peas, &c.
 Mr. J. Walker, Thame : Tulips.
 Messrs. Waveren and Kruijff, Holland : Astilbes.
 J. A. Young, Esq., Putney : Cinerarias.

FLORAL COMMITTEE, JUNE 9, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for Fuchsias, greenhouse plants, annuals, &c.

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for Carnations, &c.

Silver-gilt Banksian Medal.

To Messrs. Bunyard, Maidstone, for herbaceous plants.

To Messrs. Kelway, Langport, for Paeonies and Pyrethrums.

To Messrs. Paul, Cheshunt, for Roses.

To Messrs. Prichard, Christchurch, for herbaceous plants.

Silver Flora Medal.

To Messrs. Bath, Wisbech, for herbaceous plants.

To Messrs. Cannell, Swanley, for Cannas.

To Messrs. Clark, Dover, for Pyrethrums, &c.

To Messrs. Low, Bush Hill Park, for Carnations, &c.

To Messrs. May, Edmonton, for flowering plants.

To Messrs. Peed, Streatham, for Pyrethrums.

To Mr. Amos Perry, Enfield, for herbaceous plants.

To Mr. G. Reuthe, Keston, for alpine and herbaceous plants.

Silver Banksian Medal.

To Messrs. Baker, Codsall, for Aquilegias, Poppies, &c.

To Mr. H. Burnett, Guernsey, for Carnations.

To Messrs. Jackman, Woking, for alpinas, &c.

To King's Acre Nurseries, Hereford, for herbaceous plants.

To Mr. C. F. Waters, Balcombe, for Carnations.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for Lupines.

Award of Merit.

To Carnation 'Snowball' (votes, unanimous), from Mr. H. Burnett, Guernsey. A white, faintly scented, tree variety; flowers very full, petals smooth, not lacinate-edged, calyx good; stems rigid.

To *Deutzia Wilsonii* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A newly-introduced Chinese species with large, pure white, freely-borne flowers. Leaves lanceolate, scabrid, firm in texture, with sharply serrulate margin.

To *Iris* × 'Carthusian' (votes, 17 for), from J. W. Marshall, Esq., Godalming. Said to be a hybrid raised from an unnamed species from Mardin, Syria, which has proved a shy bloomer and poor grower in England, crossed with pollen of *Iris pallida dalmatica*. The hybrid closely resembles the latter with its sweet scent and general colour of lavender-blue, but the standards are finer and bolder, the falls a shade deeper in colour; the beard is bright yellow at the base and the claw of the fall is netted. (Fig. 45.)

To *Philadelphus Lemoinei* var. 'Rosace' (votes, unanimous), from Sir Trevor Lawrence, Bart., V.M.H., Dorking (gr. Mr. Bain). Free-flowering sprays were shown bearing semi-double pure white flowers two inches in diameter.

To *Pyrethrum* 'Langport Crimson' (votes, unanimous), from Messrs. Kelway, Langport. A single-flowered variety with flowers 8½ inches in



FIG. 45.—IRIS 'CARTHUSIAN.'

diameter, light crimson in colour, the young flowers lightly shaded with maroon, habit vigorous, stems stiff. The variety was exhibited as



FIG. 46.—PYRETHRUM 'LANGPORT CRIMSON.' (*Kelway.*)

'Langport Scarlet,' but the Committee requested that the name should be changed to 'Langport Crimson.' (Fig. 46.)

To *Rhododendron kamtschaticum* (votes, 11 for), from Mr. G. Reuthe, Keston. A hardy, procumbent alpine shrub native of North-east Asia and North America, introduced in 1802 but still uncommon in gardens. Flowers $1\frac{1}{2}$ inches in diameter, purplish-red, borne in small clusters of one to three, on inch-long pedicels. Leaves oval, ciliate at the margin and lightly on the veins beneath. Exhibited as *Rhodothamnus kamtschaticus*.



FIG. 47.—*ROSA MOYESII*. (*The Garden.*)

To *Rosa Moyesii* (votes, 21 for, 1 against), from Messrs. J. Veitch, Chelsea. A recently introduced species from China. Flowers about $2\frac{1}{2}$ inches in diameter, of an unusual shade of light red, considerably darker when young. Stems densely armed with prickles. Leaves of 9–18 oval, slightly glaucous leaflets, with a few prickles below. Roughly comparable to *Rosa rugosa* and apparently best suited for hedgerows and the hybridist. (Fig. 47.)

To Stock 'Veitch's Magenta Strain' (votes, 18 for), from Messrs. R. Veitch, Exeter. A magnificent strain of the old English Brompton

Stock, exhibited as 'Veitch's Scarlet' but the name changed at the request of the Committee to 'Veitch's Magenta.' Raceme over 12 inches long, flowers very double, 2 inches in diameter, magenta crimson in colour.

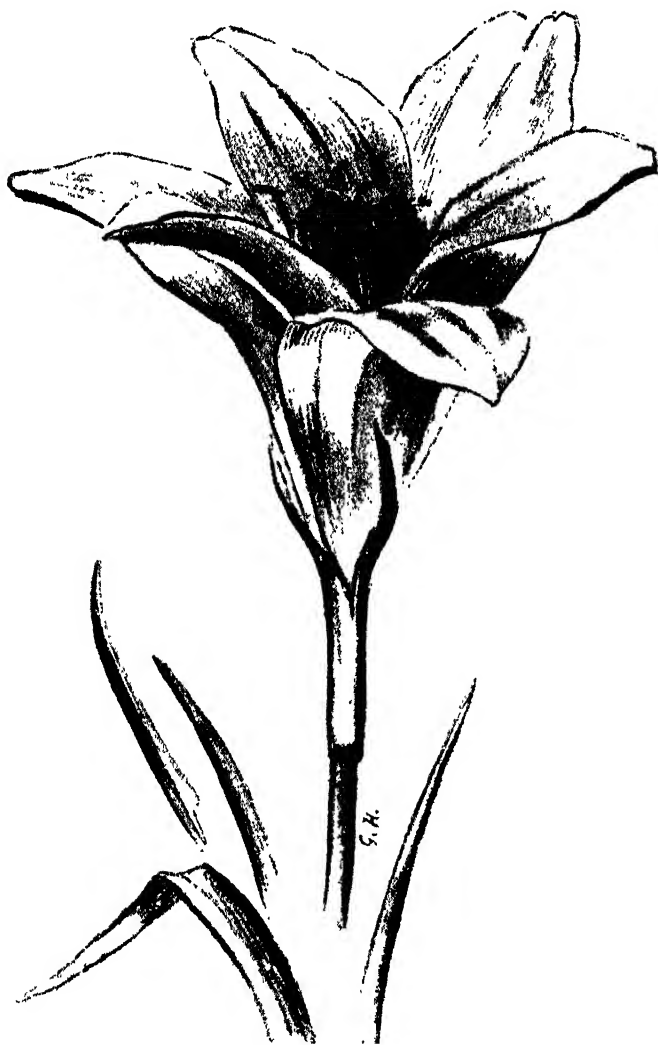


FIG. 48.—ZEPHYRANTHES AUREA. (*The Garden.*)

To *Zephyranthes aurea* (votes, unanimous), from Sir Trevor Lawrence, Bart., V.M.H., Dorking (gr. Mr. Bain). Flowers $8\frac{1}{2}$ inches in diameter, deep yellow, the outer segments $8\frac{1}{2}$ " \times 1", the inner $8\frac{1}{2}$ " \times $\frac{3}{4}$ ", stamens exserted. Leaves linear-lanceolate, deeply channelled 12" \times $\frac{1}{2}$ ", deep green above, silvery green beneath, arching. Scape one-flowered, 12 inches long. A native of Peru. One unnamed bulb was received

from South Africa ; it flowered in December last without foliage, and was exhibited and identified, but the present scape appears with the foliage. (Fig. 48).

Other Exhibits.

- Mrs. G. Austen, Godalming : Lupines and Pansies.
- Miss O. Barneby, Bromyard : unblotched Oriental Poppy.
- Messrs. Bull, Chelsea : foliage plants.
- Mr. H. Dann, Wallington : *Pelargonium* var.
- Messrs. Dobbie, Rothesay : Aquilegias and Violas.
- C. T. Druery, Esq., V.M.H., Acton : *Dactylis glomerata* var.
- Messrs. Gilbert, Dyke, Bourne : Anemones.
- Misses Hopkins, Shepperton : alpinas, &c.
- Mr. W. Matthews, Bishop's Stortford : *Pelargonium* var.
- Mrs. Sophia Miller, Marlow : Rose de Meaux.
- Mr. R. Neal, Wandsworth : Sweet Peas.
- Mr. R. C. Notcutt, Woodbridge : Pyrethrums, &c.
- Messrs. Carter, Page, London Wall : Dahlias, &c.
- Mr. W. H. Page, Hampton : Carnations.
- Mr. F. J. Patmore, Lymington : Violas and Iris.
- L. de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson, V.M.H.) : *Calceolaria* 'Golden Glory.'
- Marquis of Salisbury, Hatfield (gr. Mr. Prime) : *Schizanthus*.
- G. D. Smith, Esq., Worcester (gr. Mr. Wade) : seedling Malmaison.
- Mr. A. R. Upton, Guildford : herbaceous plants.
- Messrs. Waveren and Kruijff, Sassenheim : pink Astilbes.
- J. A. Young, Esq., Putney (gr. Mr. Street) : *Calceolarias* and *Gloxinias*.

FLORAL COMMITTEE, JUNE 23, 1908.

Mr. H. B. MAY in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

- To Messrs. May, Edmonton, for Crotons.
- To Mr. Amos Perry, Enfield, for herbaceous plants.
- To Messrs. J. Veitch, Chelsea, for flowering plants.

Silver-gilt Banksian Medal.

- To Messrs. Cutbush, Highgate, for Carnations, &c.
- To Messrs. Wallace, Colchester, for herbaceous plants.

Silver Flora Medal.

- To Mr. G. Mount, Canterbury, for Roses.
- To Messrs. Paul, Cheshunt, for Roses and Paeonies.
- To Mr. G. Reuthe, Keston, for herbaceous and alpine plants.

Silver Banksian Medal.

- To Messrs. Baker, Wolverhampton, for herbaceous plants.
- To Messrs. Barr, Covent Garden, for herbaceous plants.



FIG. 49.—*CAMPANULA RADDEANA*. (*Gardeners' Chronicle*.)

(To face page xxxiii.)

To Messrs. Brown, Peterborough, for Roses.
 To Messrs. Cannell, Swanley, for Gloxinias, &c.
 To Messrs. Ben Cant, Colchester, for Roses.
 To Messrs. Dobbie, Marks Tey, for Spanish Iris.
 To Messrs. Godfrey, Exmouth, for Pelargoniums, &c.
 To Messrs. Homan, Noordwijk, Holland, for Spanish Iris.
 To Messrs. Kelway, Langport, for Paeonies and Delphiniums.
 To Messrs. Laing, Forest Hill, for stove foliage plants.
 To Messrs. Low, Bush Hill Park, for Carnations, &c.

Bronze Banksian Medal.

To Messrs. Spooner, Woking, for Roses.

Award of Merit.

To *Anthurium* 'President Viger' (votes, 6 for, 1 against), from Messrs. Truffaut, Versailles. A handsome variety of *A. Andeanum* with orange-yellow spadix and large deeply-cordate, dark red spathe.

To *Begonia* 'Colonel Laussedat' (votes, unanimous), from Messrs. Veitch, Chelsea. A tuberous-rooted bedding variety of good habit, bearing very double bright yellow flowers about 2 inches in diameter.

To *Campanula Raddeana* (votes, unanimous), from Mr. Reuthe, Keston. A recently introduced hardy perennial species from the Caucasus, of slender habit, about a foot high. Leaves cordate, serrate, glabrous, thin but firm in texture, little more than half an inch in length and breadth; the lower ones borne on long slender petioles. Flowers loosely borne on spreading pedicels, broadly campanulate, cleft to about one-third into five spreading lobes, about an inch in length and breadth, violet-blue in colour with conspicuous yellow stigma protruding about half an inch beyond the mouth of the corolla. The ciliate, auricled calyx and flower stalks are brownish in colour; corolla lobes with a few loose hairs. (Fig. 49.)

To *Delphinium* 'Cambyzes' (votes, unanimous), from G. Ferguson, Esq., Weybridge (gr. Mr. Smith). Large pale Cornflower-blue flowers, a little shaded with mauve, with pure white centre, rather loosely borne in a very fine inflorescence about 2 feet long and 5 inches in diameter.

To *Eremurus Bungei magnificus* (votes, unanimous), from Messrs. Veitch, Chelsea. A fine seedling from *E. Bungei*, with lemon-yellow corolla and orange anthers. In height, foliage, size of inflorescence and time of flowering intermediate between *E. Bungei* and *E. robustus*.

To *Erica cinerea pygmaea* (votes, 9 for, 1 against), from Mr. Reuthe, Keston. A prostrate compact form of *E. cinerea rosea*.

To *Eschscholzia* 'Mikado' (votes, unanimous), from Mr. W. H. Gardiner, St. Osyth. Much deeper in colour than any other variety of *E. californica* that has come before the Committee, the orange red flowers, shaded with copper, having a wonderful effect when seen in bright sunshine.

To *Kniphofia* (= *Tritoma*) 'Goldelse' (votes, 10 for, 1 against), from Messrs. Wallace, Colchester. *K. pauciflora* × *K. rufa*, with the bright yellow flowers of the former species more freely borne. Inflorescence 8½ to 4 inches in length, terminating the 1½ to 2 feet stalk.

To *Pelargonium* 'James T. Hamilton' (votes, unanimous), from Messrs. Rogers, Basset, Southampton. A free-flowering hybrid between the zonal variety 'Ethel Lewis' and the Ivy-leaved 'Charles Turner,' which should prove especially valuable for pot work. The foliage and the semi-double carmine-scarlet flowers in large trusses on long stalks show the influence of the ivy-leaved pollen parent.



FIG. 50.—ROSE 'REFULGENCE.' (*The Garden.*)

To Rose 'Refulgence' (votes, unanimous), from Messrs. W. Paul, Waltham Cross. A seedling raised from the sweet brier fertilized with the pollen of a hybrid perpetual, retaining the sweet-scented foliage of the brier and bearing trusses of semi-double (two to four rows of petals) rich

rose-red flowers 8 to 8½ inches in diameter, brightened by the central boss of yellow stamens. (Fig. 50.)

To *Stokesia cyanea alba* (votes, 15 for), from Mr. Amos Perry, Enfield. The newly-introduced white form of *S. cyanea praecox*, a valuable addition to hardy herbaceous perennials.

To Sweet Pea 'Dobbie's Mid Blue' (votes, 11 for, 5 against), from Messrs. Dobbie, Marks Tey. Flowers of medium size with erect flat standard, of a shade of mauve midway between the pale and dark blues now common.

To Sweet Pea 'The King' (votes, 12 for, 6 against), also from Messrs. Dobbie. A 'Spencer' form with 'King Edward' colour. Standard large, erect, a little waved, crimson scarlet; wings shaded rose.

Other Exhibits.

Mrs. R. H. Biffen, Histon, Cambs : Sweet Pea 'Zephyr.'

Mr. J. R. Box, West Wickham : alpines.

Messrs. Bull, Chelsea : Spanish Iris.

Mr. Cole, Garden City, Letchworth : Paeonies, &c.

Mr. J. Douglas, V.M.H., Great Bookham : Pinks.

H. J. Elwes, Esq., V.M.H., Colesborne : *Eremurus* 'Colesborne seedling,' &c.

Mr. H. O. Etherington, Carshalton : Carnation 'Loveliness.'

Mrs. Holden, Nottingham : *Hydrangea scandens*.

Misses Hopkins, Shepperton : alpines, &c.

Kenneth McDouall of Logan, Stranraer : *Digitalis* 'The Genock.'

H. A. Martin, Esq., Surbiton : *Hydrangea hortensis*.

Mr. R. Neal, Wandsworth : Sweet Peas.

Messrs. Peed, Streatham : alpines.

Mrs. Scott-Elliot, Hawick : Aquilegias.

C. Scrase-Dickins, Esq., Horsham : hybrid Lilies.

Mr. W. G. Shoubridge : Viola 'Ethel Shoubridge.'

Martin R. Smith, Esq., Hayes, Kent : Carnation 'Lady Lichfield.'

Mr. A. R. Upton, Guildford : Sedums and Sempervivums.

Messrs. R. Veitch, Exeter : *Calceolaria* 'Golden Glory.'

Messrs. Ware, Feltham : Paeonies, &c.

Messrs. van Waveren and Kruijff, Sassenheim : pink Astilbes.

Mr. H. Weller, Leatherhead : Rose 'Mrs. Henry Weller.'

Mr. H. White, Windlesham : *Erica cinerea coccinea*.

FLORAL COMMITTEE, JULY 7, 1908.

AT HOLLAND HOUSE.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty members present.

[For Medals and Cups awarded by the Council see p. civ.]

Awards Recommended :—

Award of Merit.

To *Begonia* 'Duchess of Cornwall' (votes, 10 for), from Messrs. Blackmore and Langdon, Bath. A tuberous-rooted variety with large double crimson-scarlet flowers, not very full but especially fine in colour.

To *Begonia* 'Frilled Queen' (votes, 12 for, 1 against), from Messrs. Blackmore and Langdon. A richly frilled single: pink, paler towards the centre.

To *Delphinium* 'Progression' (votes, 9 for, 4 against), from Messrs. Wallace, Colchester. Flowers white, yellowish at the centre, of medium size. Habit branching.

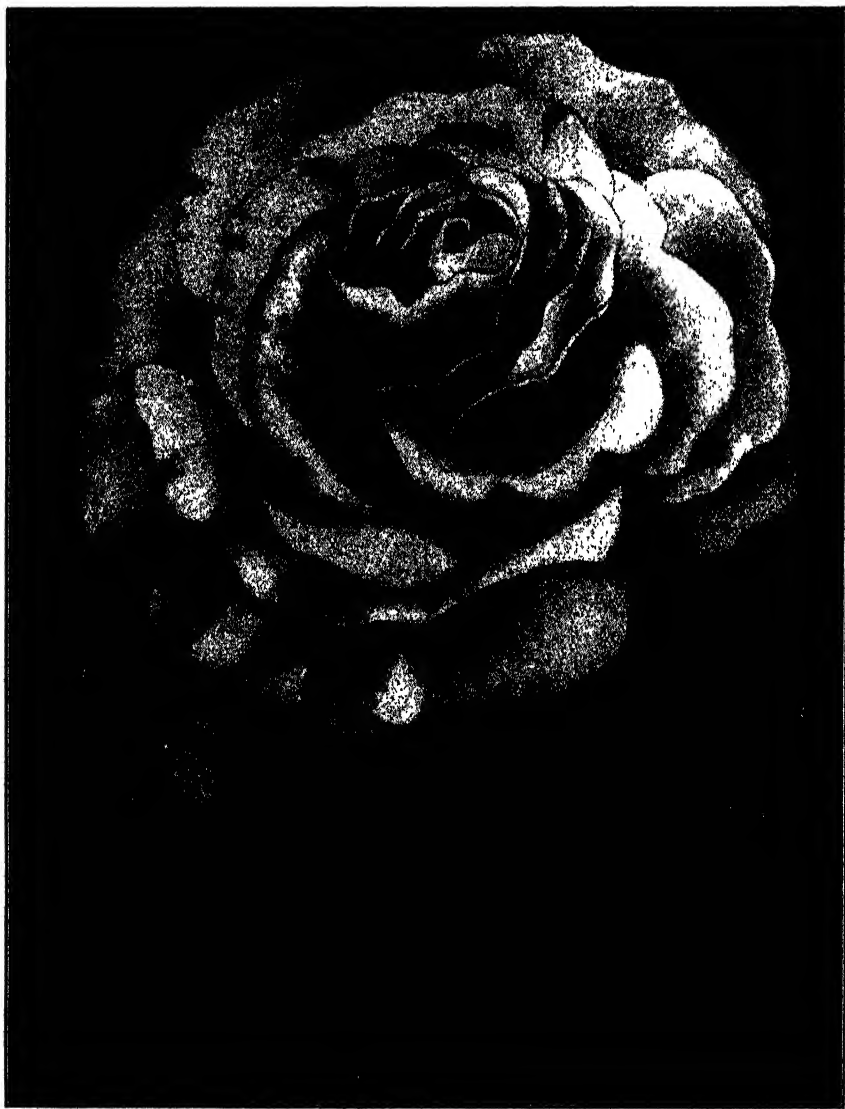


FIG. 51.—ROSE 'MRS. DAVID JARDINE.' (*Journal of Horticulture*.)

To *Delphinium* 'Statuaire Rude' (votes, unanimous), from Messrs. Blackmore and Langdon, Bath. Flowers pale mauve, the outer petals tipped with pale blue, semi-double, $2\frac{1}{2}$ inches in diameter in a magnificent

dense-flowered column over two feet in length. [Probably named in honour of the French sculptor, Rude (1784-1855).]

To Rose 'Florence Edith Coulthwaite' (votes, 11 for), from Messrs. Alex. Dickson, Newtownards. A hybrid tea-scented variety, deep cream shaded with flesh-pink which intensifies with age; flowers rather flat.

To Rose 'George C. Waud' (votes, unanimous), from Messrs. Alex. Dickson. A hybrid tea of large size, good form, unique colour, and tea-scented. Messrs. Dickson describe it as orange-vermilion, but under canvas a light rose seemed the dominant colour. It has been previously exhibited under the name 'Sir Henry Irving' but is now renamed to prevent confusion with the 'Henry Irving' recently distributed in America.

To Rose 'Mrs. David Jardine' (votes, 12 for), from Messrs. Alex. Dickson. A hybrid tea of very fine form. Soft pink, of a richer shade on the reverse of the petal. Habit erect and vigorous. Said to be an excellent forcing variety. (Fig 51.)

To Rose 'Molly Sharman Crawford' (votes, 18 for), from Messrs. Alex. Dickson. A tea rose with large, full, high-centred flower and reflexing petals; lemon-white.

To *Tunica Saxifraga fl. pl.* (votes, unanimous), from Mr. G. Reuthe, Keston. A good double form of the well-known alpine, suitable for old walls, or the rockery.

To *Viola* 'Ernest Needham' (votes, 14 for, 1 against), from Messrs. Artindale, Sheffield. Cream-white ground, rayed, with bold edging of pale violet which is darker and irregularly toothed on the inner margin; form round.

Other Exhibits.

H. H. Crane, Esq., Highgate: Violas.

Mr. A. J. Davis, Seven Kings: Sweet Peas.

The Earl of Darnley, Cobham Hall: Border Carnation.

Miss Violet Fellowes, Shotesham Park, Norwich: new plants.

Miss Franklin, Coventry: Rose var.

Mr. W. J. Godfrey, Exmouth: *Solanum Wendlandii*.

Miss Hemus, Upton-on-Severn: Sweet Peas.

Messrs. Jarman, Chard: Centaureas.

J. Kerr, Esq., Rickmansworth: Carnations.

Mr. R. Neal, Wandsworth Common: Roses, &c.

Stafford Road Nurseries, Seaford: alpines, &c.

Messrs. Walters, Bath: Delphiniums.

Messrs. Waveren and Kruijff, Sassenheim, Holland: Astilbes.

FLORAL COMMITTEE, JULY 21, 1908.

Mr. H. B. MAY, in the Chair, and twenty-four members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. J. Veitch, Chelsea, for Fuchsias, Phlox, &c.

Silver-gilt Banksian Medal.

To Messrs. J. Carter, High Holborn, for Sweet Peas and Eschscholzas.
To Mr. Dutton, Iver, Bucks, for Carnations.

Silver Flora Medal.

To E. H. Brown, Esq., Roehampton (gr. Mr. Bradford), for stove plants and Carnations.

To Messrs. Cutbush, Highgate, for Carnations.

To Messrs. Hugh Low, Enfield, for Carnations, &c.

To Messrs. May, Edmonton, for Fuchsias, &c.

To Mr. Amos Perry, Enfield, for hardy Nymphaeas, &c.

To Mr. Maurice Prichard, Christchurch, Hants, for hardy plants.

To Mr. G. Reuthe, Keston, for hardy plants.

Silver Banksian Medal.

To Messrs. G. Bunyard, Maidstone, for herbaceous plants.

To Mr. J. Douglas, Great Bookham, for Carnations.

To Messrs. Ware, Feltham, for herbaceous plants.

First-class Certificate.

To *Nelumbium speciosum* var. 'Osiris' (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr. J. Hudson, V.M.H.). A magnificent colour form of the Sacred Lotus, from Japan. Flowers bright cerise, deeper in colour at the margin, paler at the centre, whence spring the yellow stamens and stigma. (Fig. 52.)

Award of Merit.

To *Astilbe Arendsii* var. 'Ceres' (votes, unanimous), from Mr. G. Arends, Bonsdorf, Germany. A fine hybrid 3 feet high, with large plumes of lilac-rose flowers.

To *Astilbe Arendsii* var. 'Pink Pearl' (votes, 9 for, 3 against), from Mr. Arends. *Astilbe japonica compacta* × *A. Davidiana*. The inflorescence is not so fine as that of 'Ceres,' but the colour is coral pink and is retained for a longer period.

To *Begonia kewensis* (votes, 13 for, 6 against), from Messrs. J. Veitch, Chelsea. Flowers cream-white freely produced in drooping clusters from the dense green foliage: an admirable basket plant.

To Carnation 'Cardinal' (votes, unanimous), from Mr. J. Douglas, V.M.H., Great Bookham. A bright scarlet self border variety of good form.

To Carnation 'Hercules' (votes, unanimous), from Mr. Douglas. A huge, fragrant, crimson-maroon flowered Malmaison with good calyx and long stout stems (Malmaison × American Tree variety).

To Carnation 'Splendour' (votes, unanimous), from Mr. Douglas. A bright purple self border variety of good form.

To *Coriaria japonica* (votes, unanimous), from Mr. Maurice Prichard, Christchurch, Hants. A branching shrub introduced from Japan in 1896 which is generally proving quite hardy and is everywhere worth a trial. Flowers small, red, in short racemes springing from opposite leaf-scars, succeeded by coral red berries ripening to purplish-black. The

freely-borne large clusters of berries among the pale green foliage make the plant a very handsome one.

To *Rosa Wichuraiana* var. 'Lady Godiva' (votes, unanimous), from Messrs. Paul, Cheshunt. Flowers double, salmon pink becoming paler with age, borne in large clusters.

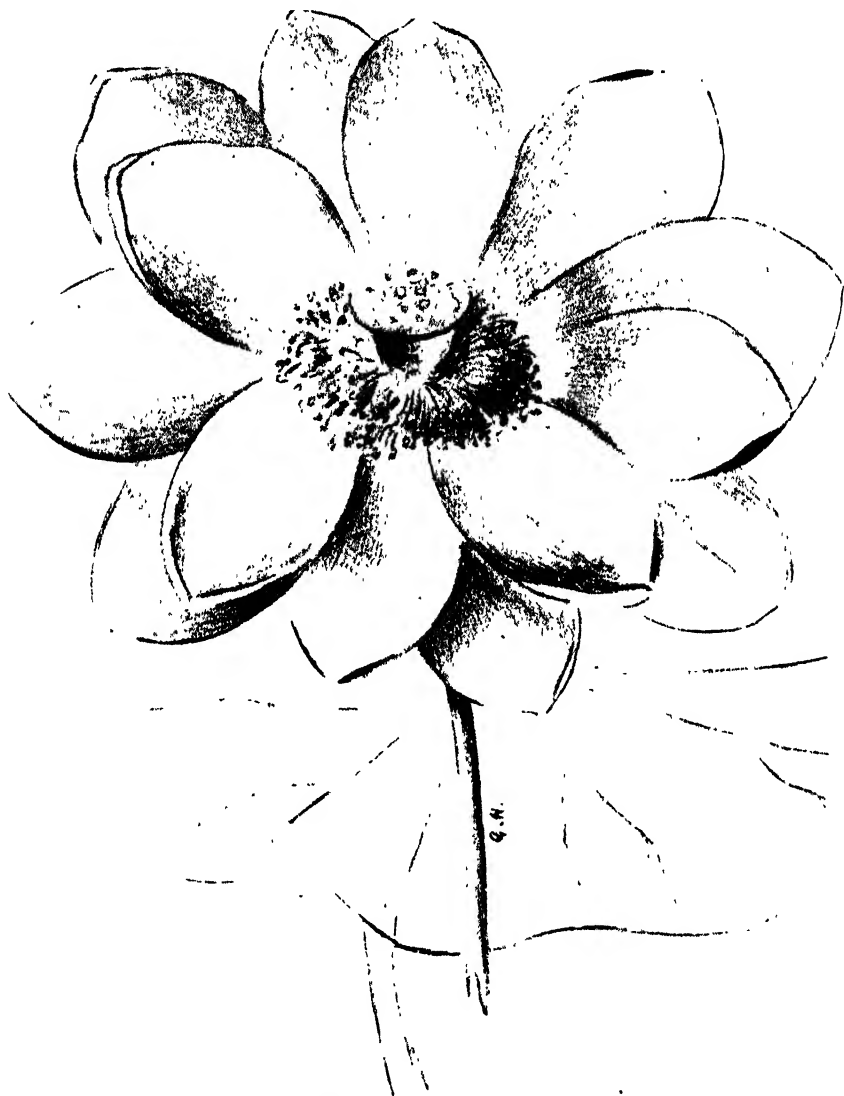


FIG. 52.—*NELUMBUM SPECIOSUM* VAR. 'OSHIRIS.' (*The Garden.*)

To *Sinningia hybrida* 'Dr. Maxwell Masters' (votes, unanimous), from Mr. Ernst Benary, Erfurt, Germany. Said to be a bigeneric hybrid between the 'Gloxinia' and a *Gesnera*. Flowers freely produced, drooping, bright rose in colour with a wide cream throat faintly spotted with brown. Foliage dark brownish green, soft and silky.

Cultural Commendation.

To Mr. J. Hudson, V.M.H., gr. to L. de Rothschild, Esq., Gunnersbury House, Acton, for *Nymphaea gigantea Hudsoniana*.

To Messrs. Cuthbert, Southgate, for *Humea elegans*.

Other Exhibits.

Messrs. Barr, Covent Garden : herbaceous plants.

Messrs. Bull, Chelsea : stove plants.

Messrs. Cannell, Swanley : Fuchsias, Begonias, &c.

Mrs. Clementi-Smith, St. Andrew's Rectory, Doctors' Commons : Bracken found wild in the City of London.

Mr. C. S. Coleman, Daventry : Pelargonium var.

Messrs. Eggett, Thames Ditton : hardy ferns.

Mr. W. H. Jenkyns, Northenden, Cheshire : Pelargonium var.

Messrs. Kelway, Langport : Gladioli.

Major Petre, Westwick, Norwich (gr. Mr. Davison) : *Erigeron* 'Quakeress.'

Messrs. Phillips & Taylor, Bracknell : Carnations.

F. C. Stoop, Esq., Byfleet (gr. Mr. Carpenter) : Carnation var.

Messrs. Sutton, Reading : Begonias.

Messrs. Watkins & Simpson, Covent Garden : Nemesias.

FLORAL COMMITTEE, JULY 30, 1908.

SUB-COMMITTEE AT WISLEY.

Mr. H. B. MAY in the Chair, and seven members present.

Highly Commended (XXX) :—

Candytuft 'Snow Queen' (votes, 5 for, 1 against), from Mr. W. Deal, Kelvedon. A dwarf white annual candytuft.

FLORAL COMMITTEE, AUGUST 4, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Kelway, Langport, for Gladioli.

Silver Flora Medal.

To Messrs. May, Edmonton, for Campanulas, Lapagerias, &c.

To Messrs. Webb & Brand, Saffron Walden, for Hollyhocks.

Silver Banksian Medal.

To Messrs. John K. King, Coggeshall, for Sweet Peas.

To Messrs. T. S. Ware, Feltham, for herbaceous Phloxes.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for Dahlias, &c.

Award of Merit.

To Carnation 'Countess of Pembroke' (votes, unanimous), from A. W. Farebrother, Esq., Wilton. A pale flesh-coloured border variety,



FIG. 58.—ROSE 'PAULA.' (*The Garden.*)

excellent in its wiry stem, firm non-bursting calyx, finely formed flower, and strong clove scent. The colour, however, becomes dull cream.

To Rose 'Paula' (votes, 8 for, 2 against), from Messrs. Paul, Cheshunt. A lemon-yellow tea rose derived from 'Geo. Nabonnand' and a seedling from 'Maréchal Niel'; strongly tea-scented, free-flowering and vigorous. In appearance 'Mme. Hoste' is suggested, and the variety should prove a good autumn bedding rose. (Fig. 58).

Other Exhibits.

Mr. W. Angus, Penicuik, N.B.: *Chrysanthemum maximum* var. 'Snowdon.'

Messrs. Artindale, Sheffield: new Violas, Carnations, &c.

Messrs. Barr, Covent Garden: seedling *Eucalypti*.

Messrs. Bull, Chelsea: new Caladiums.

Mr. B. Clarke, Oadby, Leicester: new border Carnation.

Messrs. Dobbie, Rothesay: new Antirrhinums.

Rev. W. H. Jackson, Slagsden Vicarage, Bedford: seedling Rose.

Messrs. Low, Bush Hill Park: *Agapanthus* and *Buddleia*.

Mr. Parr, Trent Park Gardens, Herts: *Lathyrus latifolius* varieties.

Mr. G. Reuthe, Keston: hardy plants.

Mr. A. Langley Smith, Wandsworth: *Geranium pratense* var.

Mr. W. A. Watts, St. Asaph: Carnations.

Mr. H. J. Wheeler, Seven Kings: new Carnations.

FLORAL COMMITTEE, AUGUST 14, 1908.

SUB-COMMITTEE AT WISLEY.

Highly Commended (XXX):—

Outdoor Cannas:

'Dr. Marcus,' from Mr. W. Pfitzer.

'Elizabeth Hoss,' from Messrs. Cannell and Veitch.

'Furst Wied,' from Mr. W. Pfitzer.

'L. E. Bally,' from Messrs. Veitch.

'Météore,' from Messrs. Cannell and Veitch.

'Wm. Saunders,' from Messrs. Conrad and Jones.

For descriptions of these see Report on Cannas at Wisley, 1907, R.H.S. JOUR. xxxiii. p. 212 *et seq.* See also Report on Cannas in the Open, 1908, p. 299.

Herbaceous Phlox (*Phlox decussata*):

'André Michaux,' from Messrs. Dobbie. Flowers soft mauve-pink, with rose eye. Truss dense, broad, very large. Vigorous. 15 inches.

'General Giovaninelli,' from Messrs. Barr, Dobbie, and Forbes. Flowers Tyrian rose, with large pale eye. Vigorous. 15 inches.

'Jules Cambon,' from Messrs. Dobbie and Forbes. Flowers pale rosy magenta, with large white eye. Truss close, broad, rather small. 2 feet.

'Lady Tweeddale,' from Mr. J. Forbes. Flowers pure white; truss large, broad. 1½ feet.

'Siebold,' from Messrs. Barr, Dobbie, Forbes, and Perry. Flowers scarlet, with darker eye. Truss large, much branched. 2 feet.

'Sesostris,' from Messrs. Dobbie and Forbes. Flowers rosy magenta, lasting. Truss large. Habit very vigorous. $2\frac{1}{2}$ feet.

These varieties will be further described in the Report on Phloxes in 1909.

FLORAL COMMITTEE, AUGUST 18, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. May, Edmonton, for Crotons.

Silver-gilt Banksian Medal.

To Messrs. Kelway, Langport, for Gladioli.

To Messrs. Carter Page, London Wall, for ornamental grasses, Dahlias, &c.

To Messrs. Peed, Streatham, for Caladiums.

To Messrs. Russell, Richmond, for hardy heaths, Fuchsias, &c.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Dahlias and Cannas.

Silver Banksian Medal.

To Mr. F. Eames, Frome, for Phloxes.

To Messrs. Laing, Forest Hill, for Caladiums.

To Messrs. Veitch, Chelsea, for miscellaneous flowering plants.

To Messrs. Ware, Feltham, for herbaceous and alpine plants.

Bronze Flora Medal.

To Sir E. G. Loder, Bart., Leonardslee (gr. Mr. W. A. Cook), for hardy flowering plants.

Award of Merit.

To Pink 'Princess Christian' (votes, 13 for, 5 against), from Messrs. Ladhams, Shirley, Southampton. A profusely flowering perpetual pink, with good habit and scented flowers with crimson centre and edge, and white ground.

To *Thalictrum dipterocarpum* (votes, 14 for, 1 against), from Messrs. Veitch, Chelsea. A newly introduced species from China closely resembling *T. Delavayi* and *T. Chelidonii*, but apparently of a more robust habit and from its free-seeding qualities likely to prove a more useful garden plant. Flowers, $\frac{1}{2}$ inch in diameter, drooping, in large, loose, terminal erect panicles; perianth segments pale purple, at length recurving; anthers numerous, pale yellow, in the specimen as long as

the perianth segments ; leaves ternately decompose, segments pale green above, glaucous-green below with prominent veins, truncately 3-lobed, elegantly disposed on glossy wiry stalks, 2-3 feet. (Fig. 54).



FIG. 54.—*THALICTRUM DIPTEROCARPUM*. (*The Garden*.)

Other Exhibits.

Messrs. Bull, Chelsea : stove plants.

Lady Florence Duncombe, Calwich Abbey, Ashbourne : Carnation seedling.

Messrs. Eggett, Thames Ditton : hardy ferns.

Mrs. A. E. Franklin, Chesham, Bucks : Carnation seedlings.

Messrs. Grove, Sutton Coldfield : *Statice tatarica rubra*.

Mr. Lansdell, Desford, Leicester : Sweet Peas.

Captain Meade, Earsham Hall, Bungay : Carnation seedling.

Messrs. Paul, Cheshunt : Rose 'Urania.'

Messrs. Pearson, Lowdham, Notts : Rose 'Mrs. Littleton Dewhurst.'

FRUIT AND VEGETABLE COMMITTEE.

MAY 12, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and seventeen members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. J. Veitch, Chelsea, for vegetables and salads.

Other Exhibits.

Colonel R. Peacock, Avon Castle, Ringwood: Melon 'Avon Park.'

Mr. N. Molyneux, Rookesbury Park, Wickham: a Melon raised from 'Scarlet Gem' × 'Hero of Lockinge.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 9, 1908.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. J. Veitch, Chelsea, for Fig and Peach trees in pots.

Silver Banksian Medal.

To Mrs. Martin, Auburn, New York, for bottled fruits.

To Mr. S. Mortimer, Farnham, for Cucumbers.

Cultural Commendation.

To S. Heilbut, Esq., Holyport, Maidenhead (gr. Mr. Camp), for Nectarine 'Early Rivers.'

Other Exhibits.

Mrs. Miller, Marlow: Chutney.

FRUIT AND VEGETABLE COMMITTEE, JUNE 23, 1908.

Mr. GEO. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. Dobbie, Rothesay, for new Potatoes and Radishes.

To S. H. King, Esq., Ashford (gr. Mr. Weston), for Grapes.

To W. Preedy, Esq., Agent-General for New South Wales, Cannon Street, E.C., for fruit from the experimental farm of the New South Wales Government.

Other Exhibits.

Messrs. J. Veitch, Chelsea: vegetables.

FRUIT AND VEGETABLE COMMITTEE, JUNE 30, 1908.

SUB-COMMITTEE AT WISLEY.

Mr. JOS. CHEAL in the Chair, and four members present.

Awards Recommended :—

Award of Merit.

To Bean 'Leviathan White Long Pod,' from Messrs. Carter, High Holborn.

To Peas 'Daffodil,' 'Dawn,' 'Evergreen D  licatesse,' 'Harvestman,' 'International,' 'Snowdrop'; all from Messrs. Carter, High Holborn.

For descriptions see Reports of trials at Wisley, 1908, p. 288.

FRUIT AND VEGETABLE COMMITTEE, JULY 7, 1908.

AT HOLLAND HOUSE.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty members present.

[For Cups and Medals awarded by the Council see p. civ.]

The awards recommended by the Sub-Committee at Wisley on June 30 were confirmed.

Award Recommended :—

Award of Merit.

To Blackberry hybrid 'Low Junior' (votes, unanimous), from Messrs. Low, Bush Hill Park. A reputed cross between the blackberry and the loganberry, with the colour of the former and the size of the latter. The fruits shown had been ripened under glass.

Other Exhibits.

Messrs. Laxton, Bedford: Strawberries 'Cropper,' 'The Bedford,' and 'Epicure.'

H. P. Sturgis, Esq., Givons, Leatherhead (gr. Mr. Peters): Strawberries 'William Peters,' 'Marmaduke,' and 'Black Peter.'

FRUIT AND VEGETABLE COMMITTEE, JULY 21, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Award Recommended :—

Silver Knightian Medal.

To Messrs. Dobbie, Rothesay, for Peas.

Other Exhibits.

Messrs. Clibrans, Altrincham: Broad Bean 'Clibran' which the Committee considered to be well-grown 'Seville Longpod.'

Messrs. J. K. King, Coggeshall: Peas.

W. Phipson Beale, Esq., K.C., M.P., Drumlamford, Barrhill, Ayrshire (gr. Mr. Palmer): Tomatos.

Messrs. J. Veitch, Chelsea : Lettuce.

Mr. J. Ross, Ham Court Gardens, Upton-on-Severn : Melon.

Mr. R. Staward, Panshanger Gardens, Hertford : three varieties of Peas.

Messrs. Spooner, Hounslow : Apple 'Red Margaret.'

FRUIT AND VEGETABLE COMMITTEE, JULY 31, 1908.

SUB-COMMITTEE AT WISLEY.

Mr. A. H. PEARSON in the Chair, and ten members present.

Awards Recommended :—

Award of Merit.

To Beet 'Sutton's Globe,' from Messrs. Sutton, Reading.

To Dwarf Bean 'Carter's Perpetual,' from Messrs. Carter, High Holborn.

To Parsley 'Massey's Dwarf Perfection,' from Messrs. Massey, Spalding.

To Potato 'Courteen Seedling,' for pot or frame culture, from Mr. G. Taylor, Byram Gardens, Yorks.

To Potato 'Midlothian Early,' from Messrs. Dobbie, Rothsay.

[For descriptions see Reports of Trials at Wisley, 1908.]

FRUIT AND VEGETABLE COMMITTEE, AUGUST 4, 1908.

Mr. A. H. PEARSON in the Chair, and eleven members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. J. Veitch, Chelsea, for fruit trees in pots.

Silver Knightian Medal.

To Mrs. W. H. Plowman, Chapter Street, Westminster, for bottled fruits, jams, jellies, &c.

Silver Banksian Medal.

To Messrs. Carter, High Holborn, for French beans.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 18, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. W. Paul, Waltham Cross, for fruit trees in pots.

Silver Banksian Medal.

To Messrs. Spooner, Hounslow, for Apples.

Award of Merit.

To Apple 'Feltham Beauty' (votes, unanimous), from Messrs. Veitch, Chelsea. Fruits flattish-round, medium size; eye closed with long calyx segments, in puckered shallow basin; skin greenish yellow, heavily streaked with red; stalk slender, half-inch long, inserted in shallow



FIG. 55.—APPLE 'FELTHAM BEAUTY.' (*The Garden*).

cavity; very similar to Cox's Orange at base; flesh crisp and peculiarly aromatic (Mr. Gladstone \times Cox's Orange Pippin). (Fig. 54.)

Other Exhibits.

Col. Archer-Houblon, Newbury : seedling Apple.

Messrs. Mathews, Abingdon : seedling Apples.

F. W. Platt, Esq. Highgate : scarlet runner Beans.

W. A. Voss, Esq., Rayleigh : scarlet runner Beans.

ORCHID COMMITTEE.

MAY 12, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-four members present.

Award Recommended :—

Silver Lindley Medal.

To Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman), for a superbly grown plant of the fine *Odontoglossum crispum* 'Leonard Perfect.' (Fig. 56.)



FIG. 56.—*ODONTOGLOSSUM CRISPUM* 'LEONARD PERFECT.' (*Gardeners' Chronicle*.)

Silver Flora Medal.

To Messrs. Jas. Veitch, Chelsea, for a group, including *Brasso-Catt-Laelia* \times *Veitchii*.

To Messrs. Cypher, Cheltenham, for a group.

Silver Banksian Medal.

To H. S. Goodson, Esq., Putney (gr. Mr. G. E. Day), for a group.

To Mons. M. Mertens, Ghent, for hybrid *Odontoglossums*.

First-class Certificate.

To *Odontoglossum crispum* 'Leonard Perfect' (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). A very large-flowered, white variety with the inner halves of the segments each bearing one large irregular violet-purple blotch. (Fig. 56.)

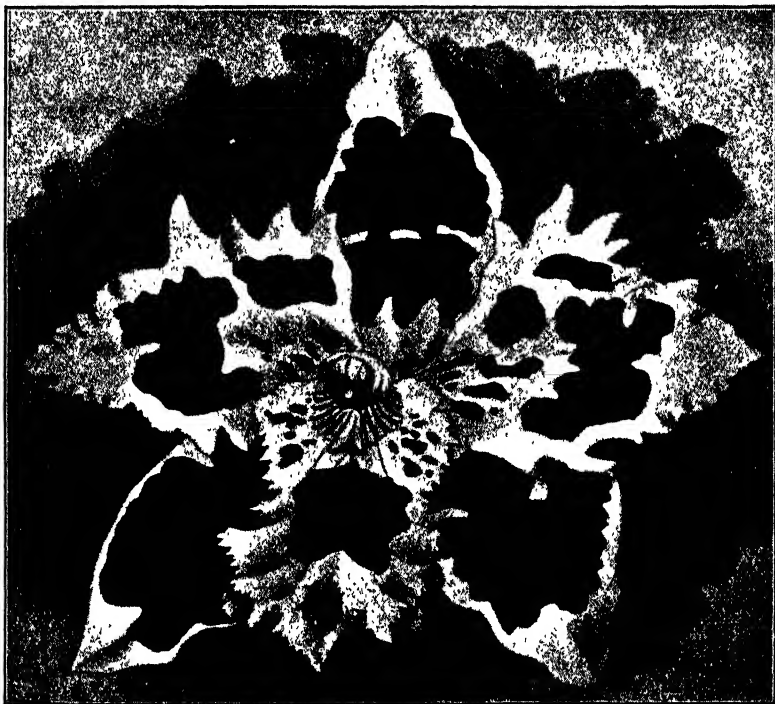


FIG. 57.—*ODONTOGLOSSUM* × *WILCKEANUM* *SCHRODERIANUM*.
(*Journal of Horticulture*.)

To *Cattleya Mossiae Goossensiana* (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White). Of the *C. M. Reineckiana* class. Sepals and petals pearly white, lip bright reddish-violet, with crimped white margin. **A.M.** May 31, 1899.

To *Brasso-Cattleya* × *heatonensis* (*B. Digbyana* × *C. × Hardyana*) (votes unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Flower large, yellowish, tinged with pale rose, lip trumpet-shaped, fringed and with a yellowish emerald-green disc.

To *Odontoglossum* × *Wilckeanum Schroderianum* (votes unanimous), from Baron Sir H. Schröder, The Dell, Egham (gr. Mr. H. Ballantine).

A fine variety with yellow flowers heavily marked with chestnut-red ; petals fringed. (Fig. 57.)

Award of Merit.

To *Odontoglossum* × *Ossulstonii*, Glebelands variety (*Pescatorei* *Charlesworthii* × *crispo-Harryanum*) (votes unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Inflorescence branched ; flowers white blotched with claret.

To *Odontoglossum* × *illustre* var. 'Theodora' (*Vuykstekei* × *ardentissimum*) (votes, 15 for, 8 against), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). Flowers opening a light bronzy hue changing to rosy-mauve when mature ; margin silver-white.

To *Odontoglossum nebulosum Mossiae* (votes, unanimous), from J. S. Moss, Esq., Wintershill Hall, Bishops Waltham. Flowers white with yellow crest to the lip, shown as *Odontoglossum apterum*.

To *Angraecum Germinyanum* (votes unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A dwarf, slender species from Madagascar producing solitary flowers ; the large white labellum uppermost, the narrow deflected greenish sepals and petals and longer spur drooping beneath. The little plant bore four fine flowers.

Botanical Certificate.

To *Epidendrum leucochilum* from Sir Trevor Lawrence, Bart. Stems leafy, flowers having greenish sepals and petals and a trilobed white lip.

To *Eria amica* Rchb. f. (*E. confusa*), from Sir Trevor Lawrence, Bart. The plant bore five racemes of whitish flowers striped with red, the front of the lip being yellow.

To *Megaclinium velutinum*, from Sir Trevor Lawrence, Bart. Flowers borne in two rows on a flat purple rachis. Imported from West Africa.

Other Exhibits.

Lieut.-Col. G. L. Holford : *Odontoglossum crispum* 'Zoroaster.'

J. Gurney Fowler, Esq. : *Odontoglossum crispum* 'Britannia.'

Pantia Ralli, Esq. : two varieties of *Dendrobium Rallianum*.

De B. Crawshay, Esq. : well-grown *Odontoglossums*.

The Hon. Mrs. Foley : *Lissochilus purpuratus*.

Miss Willmott : *Maxillaria porphyrostele*.

H. J. Bromilow, Esq. : varieties of *Cypripedium bellatulum*.

Reg. J. Farrer, Esq., Clapham, Yorks : *Odontoglossum crispum* 'Anne Boleyn.'

Mr. A. W. Jensen : a group.

Messrs. Hugh Low : Cattleyas, &c.

ORCHID COMMITTEE, MAY 26, 27, 28, 1908.

AT THE INNER TEMPLE GARDENS.

Mr. H. J. VEITCH, V.M.H., in the Chair, and twenty-four members present.

[For Cups and Medals awarded by the Council after consultation with the Judges, see p. xciv.]

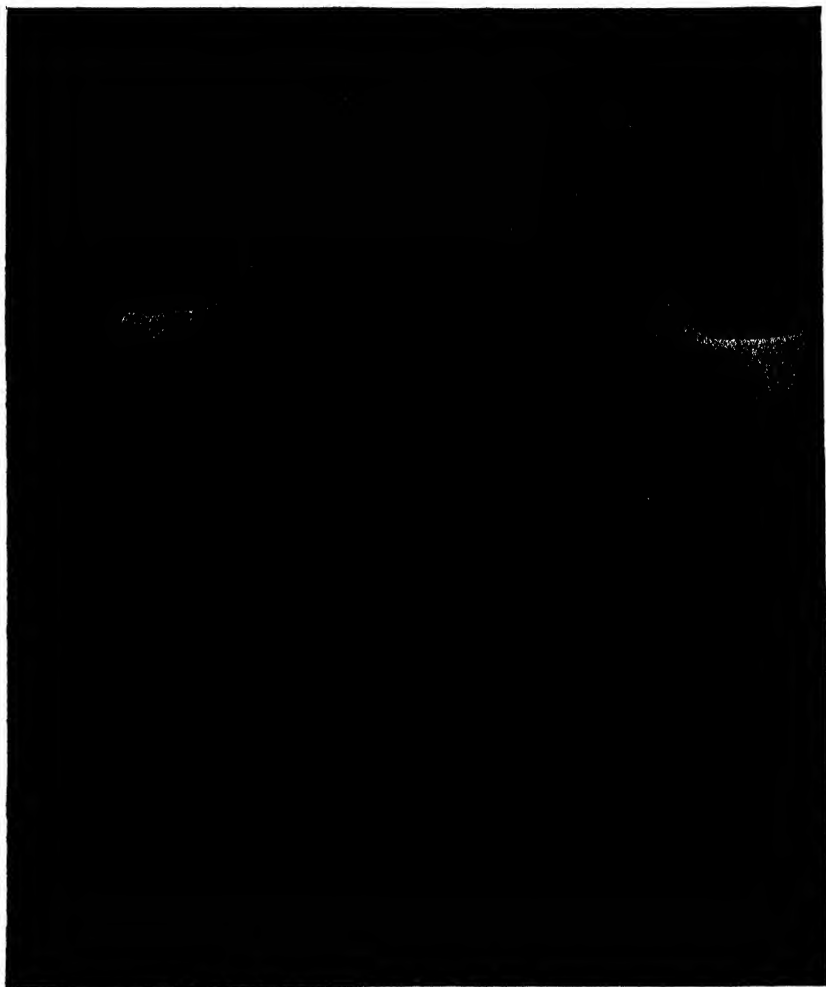


FIG. 58. — LAELIO-CATTLEYA 'ELVA,' WESTONBIRT VARIETY. (*Gardeners' Chronicle*.)

Awards Recommended :—

First-class Certificate.

To *Laelio-Cattleya* × 'Elva,' Westonbirt variety (*C. Warscewiczii* × *L.-C. Ingramii*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Flowers deep

rose with ruby-crimson labellum, having a pale yellow spot on each side in the tube. (Fig. 58.)

To *Cattleya Mendelii* 'His Majesty the King' (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A large and finely formed bluish-white flower with a distinct purple blotch on the front of the lip.

To *Odontioda* \times *Charlesworthii* (*O. Harryanum* \times *C. Noezliana*) (votes, unanimous), from Messrs. Charlesworth. Flowers of a uniform



FIG. 59.—ODONTIODA CHARLESWORTHII. (*The Garden.*)

deep ruby-crimson with a reddish glow over the surface; crest spiny, yellow. (Fig. 59.)

To *Odontoglossum* \times *illustre luxurians* (*Vuykstekei* \times *ardentissimum*) (votes, unanimous), from Mons. Chas. Vuyksteke, Loochristi, Ghent. A fine hybrid with reddish-purple flowers, having white margins and tips to the segments.

To *Odontoglossum* \times *eximium* 'Queen Alexandra' (\times *ardentissimum* \times *crispum*) (votes, unanimous), from Mons. Chas. Vuyksteke. Flowers deep reddish purple with slight transverse lines and margin of white.

To *Cypripedium ventricosum* (votes, unanimous), from Messrs. Cutbush. A very handsome hardy species, native of Siberia, and allied to *C. macranthum*. Labellum large, ventricose, deep rose colour.

Award of Merit.

To *Odontioda* × 'St. Fuscien' (*O. Adrianae* × *C. Noezliana*) (votes, unanimous), from Mons. Henri Graire, St. Fuscien, Amiens, France. Flowers light yellow blotched and margined with scarlet; front of the lip tinged with rose.

To *Odontoglossum* × *hibernicum* (*Hallii* × *hastilabium*) (votes, unanimous), from Messrs. Charlesworth. Sepals and petals closely marked with brown, tips sulphur-yellow; lip brown at the base, white in front.

To *Cirrhopetalum pulchrum* (votes, unanimous), from Sir Jeremiah Colman, Bart., Gatton Park, Reigate (gr. Mr. W. P. Bound). A strong-growing species with fine umbels of rose-tinted flowers.

To *Odontoglossum Lindenii* (votes, unanimous), from Sir Jeremiah Colman, Bart. Flowers chrome-yellow.

To *Odontoglossum* × *laudatum* (parentage unrecorded) (votes, 12 for, 4 against), from Mons. Chas. Vuylsteke. Flowers heavily blotched with purple.

To *Odontoglossum crispum* 'Kenneth' (votes, 14 for, 2 against), from Norman C. Cookson, Esq., Oakwood, Wylam. Flower of fine form and with all segments equally broad; white with deep reddish-purple blotches.

To *Cattleya Mossiae* 'Le Président' (votes, unanimous), from Messrs. Hugh Low. A finely coloured typical form.

Botanical Certificate.

To *Bulbophyllum mirum*, from Sir Jeremiah Colman, Bart. A singular species from Sumatra with small angular pseudo-bulbs on slender rhizomes; flowers in pairs, each 1 inch in length, white, closely spotted with purple. A singular feature in the flower is the small nearly orbicular petals, each bearing a motile fringe.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid grower to Lieut.-Col. G. L. Holford, for *Miltonia vexillaria* with twenty-eight spikes bearing together 184 flowers.

Other Exhibits.

Mr. J. Robson, Altrincham: a small group.

Mrs. Collingwood, Lilburn Tower, Alnwick: a group of *Vandateres*.

H. S. Goodson, Esq.: *Odontoglossums*.

H. T. Pitt, Esq.: *Odontoglossum crispum* 'Snow Queen.'

Mr. J. Birchenall, Alderley Edge: *Schlimmania trifida* and *Bollea Lalindei*.

Baron Sir H. Schröder (gr. Mr. Ballantine): rare *Odontoglossums*.

Mons. Jules Hye de Crom: *Miltonia* × *Hyeana*.

ORCHID COMMITTEE, JUNE 9, 1908.

Mr. H. J. VEITCH, V.M.H., in the Chair, and seventeen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Charlesworth, Bradford, for hybrids.

To Messrs. Hugh Low, Enfield, for a group of *Cattleyas* and *Odontoglossums*.

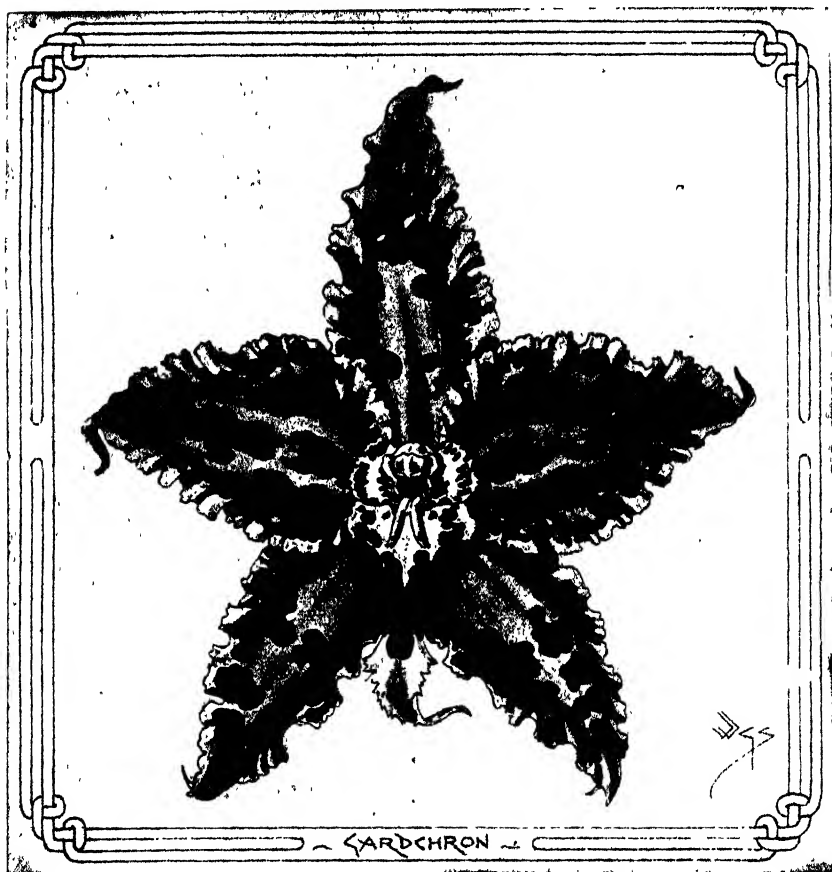


FIG. 60.—*ODONTOGLOSSUM* × *PHOEBE*. (*Gardeners' Chronicle*.)

Silver Banksian Medal.

To Messrs. J. & A. A. McBean, Cooksbridge, for *Odontoglossums*, &c.

To De B. Crawshay, Esq., Sevenoaks (gr. Mr. Stables), for hybrid *Odontoglossums*.

To Messrs. Stanley, Southgate, for a group of *Cattleya Mossiae*.

To Mr. A. W. Jensen, Lindfield, for a group.

First-class Certificate.

To *Miltonia* × 'St. André' (× *Bleuana* × *Roezlii*) (votes, unanimous), from Baron Sir H. Schröder, The Dell, Egham (gr. Mr. H. Ballantine). Flowers white, with the inner halves of the petals tinged with violet and the base of the lip having radiating lines of red-brown.

To *Odontoglossum* × 'Phoebe' (*cirrhosum* × *crispum*) (votes, unanimous), from Baron Sir H. Schröder. Flowers equal in size to *O.* × *ardentissimum*, white, heavily blotched with purplish-red. (Fig. 60.)

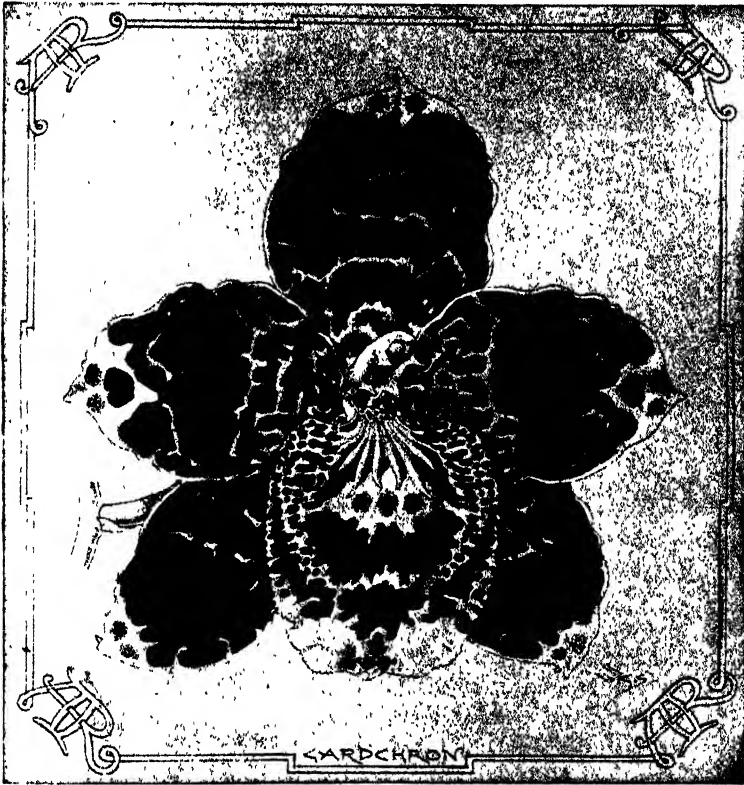


FIG. 61.—*ODONTOGLOSSUM* 'QUEEN ALEXANDRA,' VAR. *CRAWSHAYANUM*.
(*Gardeners' Chronicle*.)

To *Odontoglossum* × 'Queen Alexandra' *Crawshayanum* (*Harry-anum* × *triumphans*) (votes, unanimous), from De B. Crawshay, Esq. (gr. Mr. Stables). A very large broad-petaled flower; sepals and petals yellow, the ground colour almost hidden by large purple-brown blotches; lip white, with the basal three-fourths marked with rose colour. (Fig. 61.)

Award of Merit.

To *Odontoglossum gloriosum citrinum* (votes, unanimous), from Messrs. McBean, Cooksbridge. Flowers pale citron-yellow, the usual brown spotting being suppressed and replaced by a slightly darker yellow tint.

To *Miltonia* × *Bleuana* var. *Stevensii* (*Roezlii alba* × *vexillaria Leopoldii*) (votes, 8 for, 4 against), from W. Thompson, Esq., Walton Grange, Stone (gr. Mr. Stevens). A compact and floriferous form with white flowers, having reddish lines at the base of the lip.

Cultural Commendation.

To Mr. May, gr. to J. B. Joel, Esq., Childwickbury, for a fine specimen of *Odontoglossum Rothschildianum*, 'Northaw variety,' with five spikes.

Other Exhibits.

Messrs. J. Veitch: *Cypripedium spectabile*.

Mons. Mertens, Ghent: hybrid *Odontoglossums*.

Walter Cobb, Esq., Rusper (gr. Mr. C. J. Salter): *Cattleya* × *Martinetii dulcotensis*.

G. W. Bird, Esq., West Wickham (gr. Mr. Redden): an *Odontioda* resembling *O. heatonensis*.

ORCHID COMMITTEE, JUNE 28, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver Flora Medal.

To De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables), for hybrid *Odontoglossums*.

To Messrs. Charlesworth, Heaton, Bradford, for a group.

Silver Banksian Medal.

To Messrs. Stanley, Southgate, for *Cattleyas*.

First-class Certificate.

To *Odontoglossum crispum* 'Princess of Wales' (votes, unanimous), from Baron Sir H. Schröder, The Dell, Egham (gr. Mr. Ballantine). A large form with broad-petaled white flowers, the sepals being tinged with lilac and the labellum having a large brown blotch in front of the yellow crest.

Award of Merit.

To *Odontioda* × *Wickhamensis* (*Odontoglossum crispum* × *Cochlioda sanguinea*) (votes, 16 for, 1 against), from G. W. Bird, Esq., Manor House, West Wickham (gr. Mr. Redden). Resembling *O. × heatonensis*, but with broader and less acute segments. Flowers white, tinged with rose-pink and spotted with light red.

To *Epidendrum virens* (votes, 14 for, 2 against), from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. White). Sepals and petals pale green, lip white with some purple lines; fragrant. Guatemala.

To *Dendrobium Jerdonianum* (votes, unanimous), from Sir Trevor Lawrence, Bart. A compact evergreen species with a profusion of orange-coloured flowers with long narrow segments. Native of Western Ghats, India; altitude 2,000 feet.

Botanical Certificate.

To *Bulbophyllum fusco-purpureum*, from Sir Trevor Lawrence, Bart. Flowers in racemes on long pedicels, each nearly 1 inch long; brownish-purple, the lip darkest; petals continued into long filaments. Nilgiri Hills.

To *Eulophia nuda*, from Sir Trevor Lawrence, Bart. Flowers on stout spikes; green, with white labellum.

To *Phalacnopsis Lindenii*, from Sir Trevor Lawrence, Bart. Foliage marbled-white, as in *P. Schilleriana*; flowers white and rose colour, like *P. rosea*, but with an ovate front lobe to the lip.

To *Bifrenaria tetragona*, from Messrs. Charlesworth. Flower of thick substance, green, tinged with purple; lip white externally, purple within.

To *Vanda primula*, from Messrs. Moore, Rawdon, Leeds. A dwarf species from the Sikkim Hills. Flowers in pairs, white, with purple lines on the upper side of the labellum.

Other Exhibits.

Baron Sir H. Schröder: *Odontoglossum crispum* 'Prince of Wales.'

Sir Trevor Lawrence, Bart., K.C.V.O.: several interesting species.

Francis Wellesley, Esq.: *Cattleya Mendelii majestica*. A very large form; and *C. M.* 'Venus,' a pretty, light variety.

Henry Little, Esq.: *Laelio-Cattleya Epicasta* 'Little's variety.'

H. S. Goodson, Esq.: *Odontoglossum crispum* 'Mrs. Humphrey.' A blotched variety.

Lieut.-Col. Holford, C.I.E., C.V.O.: *Dendrobium* × *Dalhou-nobile*.

AT HOLLAND HOUSE, ORCHID COMMITTEE, JULY 7-8, 1908.

Mr. H. J. VEITCH, V.M.H., in the Chair, and twenty-two members present.

[For Cups and Medals awarded by the Council after consultation with the Judges see p. civ.]

Awards Recommended:—*First-class Certificate.*

To *Laelio-Cattleya* × 'Clive' *magnifica* (*L. primula praestans* × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander). A dwarf *Laelio-Cattleya* with large flowers, having the sepals and petals deep rose, the lip purplish-claret, with gold lines from the base.

To *Odontoglossum* × *coeruleum* 'King of England' (parentage unrecorded) (votes, unanimous), from H. S. Goodson, Esq., West Hill, Putney (gr. Mr. G. E. Day). Flowers large with broad segments, white, heavily blotched with violet; lip chocolate-purple with white margin and yellow crest.

Award of Merit.

To *Odontoglossum* × 'Eleanor,' Westonbirt variety (*cirrhosum* × *Uro-Skinneri*) (votes, unanimous), from Lieut.-Col. G. L. Holford. Inflor-

escence branched. Flowers sap-green spotted with chocolate; lip white, marked with violet.

Cultural Commendation.

To Mr. H. G. Alexander, orchid-grower to Lieut.-Col. G. L. Holford, C.I.E., C.V.O., for a finely grown specimen of *Odontoglossum* × 'Othello' (*Harryanum* × *Adrianae*), with two spikes of many large flowers.

To Mons. Chas. Vuylsteke, Ghent, for the original plant of *Odontioda* × *Vuylstekea* (*O. Pescatorei* × *C. Noezliana*), first shown by him May 31, 1904.

Other Exhibits.

Lieut.-Col. G. L. Holford: *Sophro-Laelio-Cattleya* × 'Danae' (*S.-L. laeta Orpetiana* × *C. Harrisoniae*).

Walter Cobb, Esq. (gr. Mr. C. J. Salter): *Odontoglossum* × *formosum* 'Cobb's variety.'

F. M. Ogilvie, Esq. (gr. Mr. Balmforth): two fine varieties of *Miltonia vexillaria*.

W. Thompson, Esq. (gr. Mr. Stevens): *Odontioda* × *Charlesworthii*.

Mons. Fl. Claes, Brussels: fine varieties of *Cattleya Mendelii* and *C. Mossiae*.

Mons. A. A. Peeters, Brussels: hybrid *Cattleyas*.

ORCHID COMMITTEE, JULY 21, 1908.

Mr. J. GURNEY FOWLER in the Chair, and eighteen members present.

Awards Recommended:—

Silver Flora Medal.

To Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander), for a group.

Silver Banksian Medal.

To Messrs. Charlesworth, for a group.

To Messrs. Hugh Low, for a group.

First-class Certificate.

To *Stanhopea tigrina* (votes, unanimous), from Messrs. Charlesworth. The large yellow and dark purple species first introduced from Mexico in 1839.

Award of Merit.

To *Angraecum Augustum*, Rolfe (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A remarkable species sent from North-East Rhodesia by Mr. Augustus Old. Leaves very fleshy, grey-green. Inflorescence produced as in *A. Kotschyi*. Flowers pure white, with pale greenish spurs 6 inches long.

To *Odontioda* × *Thwaitesii* (*Cochlidia vulcanica* × *Odontoglossum Harryanum* (votes, unanimous), from R. G. Thwaites, Esq., Streatham (gr. Mr. Black). Sepals and petals bronzy-claret; lip rosy-lilac, with yellow crest.

Botanical Certificate.

To *Epidendrum costatum*, from Sir Trevor Lawrence, Bart. A Mexican species growing like a strong *Barkeria*, producing a nodding raceme of about fifteen reddish flowers with acuminate yellow tips to the sepals and petals; lip whitish, ridged, marked with purple.

To *Geodorum purpureum*, from Sir Trevor Lawrence, Bart., K.C.V.O. *Phaius*-like in growth. Inflorescence erect, bearing at the top a decurved head of white flowers marked with purple on the lip.

Other Exhibits.

W. P. Burkinshaw, Esq., Hessle, Hull (gr. Mr. Barker): *Cattleya Warscewiczii*, Rochford's variety.

Mr. J. Birchenall, Alderley Edge: three varieties of *Bollea Lalindei*.

Messrs. Jas. Veitch: the fine white *Cattleya* × *Dusseldorfei* 'Undine.'

Sir Trevor Lawrence, Bart., K.C.V.O.: *Laelia* × 'Bella' (*majalis* × *purpurata*).

The Right Hon. Lord Rothschild, Tring Park (gr. Mr. A. Dye): *Stanhopea inodora* with ten flowers on a spike.

ORCHID COMMITTEE, AUGUST 4, 1908.

Mr. H. J. VEITCH in the Chair, and nine members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group of *Cypripediums*, &c.

Silver Banksian Medal.

To Mons. Mertens, Ghent, for *Odontoglossums* and *Miltonias*.

First-class Certificate.

To *Sophro-Cattleya* × *warnhamensis* var. 'J. M. Black' (*C. amethystoglossa* × *S. grandiflora*) (votes, unanimous), from R. G. Thwaites, Esq., Streatham (gr. Mr. Black). Sepals and petals deep crimson with a claret shade; disc of the lip yellow, the tips of the side lobes and front lobe ruby red. (Fig. 62.)

Award of Merit.

To *Vanda* × *amoena* var. *Sanderae* (natural hybrid *V. coerulea* × *V. Roxburghii*) (votes, unanimous), from Messrs. Sander. A much finer flower than the original and probably the reverse cross, the seed being borne by *V. coerulea*. Flowers formed like *V. coerulea*, cream-white, broadly netted with violet; lip claret colour.

Botanical Certificate.

To *Angraecum Whytei*, from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White). Allied to *Angraecum (Listrostachys) Chaillianum*. Flowers white, with pointed brown-tinted spurs. Native of Uganda.

Cultural Commendation.

To Mr. G. G. Whitelegge, gr. to J. Bradshaw, Esq., The Grange, Southgate, for *Lycaste tricolor* with twenty-nine flowers.

Other Exhibits.

H. S. Goodson, Esq., Putney (gr. Mr. Day): two varieties of *Brasso-Cattleya* × 'Pluto,' and *Cattleya* × 'Atalanta' var. *Goodsoniae*.



FIG. 62.—SOPHRO-CATTELEYA WARNEAMENSIS 'J. M. BLACK.' (*The Garden*.)

R. G. Thwaites, Esq. (gr. Mr. Black): *Cattleya superba alba*, and two examples of *Odontioda* × *Thwaitesii*.

Mr. Jas. Douglas, V.M.H.: an *Angraecum* received from Tropical Africa. (See p. cxvi.)

Herr Otto Beyrodt, Marienfelde, Berlin: *Cattleya* × 'Harold' var. 'Hildegard' (*Gaskelliana alba* × *Warscewiczii* 'Frau Melanie Beyrodt').

ORCHID COMMITTEE, AUGUST 18, 1908.

Mr. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended :—

Silver Flora Medal.

To Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White), for a group of new and rare Orchids.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a group.

To Messrs. Charlesworth, Heaton, Bradford, for a group.

To Messrs. Gurney, Wilson, Hayward's Heath, for a group of *Miltonia vexillaria*.

Silver Banksian Medal.

To De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables), for a group of hybrid *Odontoglossums*.

To Messrs. Moore, Rawdon, for a group.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Odontoglossum* × *Wiganianum superbum* (*Wilckeanum* × *Rolfeae*) (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. White). A very large form with citron-yellow sepals and petals blotched with dark purple; lip white, with purple markings around the yellow crest.

Award of Merit.

To *Sophro-Laelio-Cattleya* × 'Medea' var. *vinicolor* (*S.-L.* × *laeta Orpetiana* × *C. bicolor*) (votes, unanimous), from Lieut. Col. G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). In size and form resembling *Cattleya bicolor*, and of a uniform claret colour with large fleshy white column.

To *Cypripedium* × *Rosettii* (*insigne Sanderianum* × *Maudiae*) (votes, unanimous), from Lieut.-Col. G. L. Holford. Flowers yellow, with green veining on the dorsal sepal, the upper portion of which is white.

To *Sophro-Laelio-Cattleya* × 'Marathon' (*S.-L.* × 'Psyche' × *C.* × 'Empress Frederick') (votes, unanimous), from Messrs. Charlesworth. Resembling a small form of *Cattleya* × 'Empress Frederick.' Sepals and petals silver-white, tinged with lilac; lip ruby-purple, with yellow markings on the disc.

To *Trichopilia nobilis alba* (votes, 8 for, 3 against), from Messrs. Charlesworth. A pure white form, without the yellow eye usually seen in the species.

To *Odontoglossum* × 'Zenobia' (*Hallii* × *Edwardii*) (votes, unanimous), from De B. Crawshay, Esq. (gr. Mr. Stables). Inflorescence branched; flowers numerous, chocolate-purple, with cream-white tips to the segments.

Botanical Certificate.

To *Catasetum labiatum*. Flowers erect, globular, with the front of the lip projecting from the opening in the labellum.

To *Catasetum Claesianum*. Flowers greenish, with fringed sides to the helmet-shaped labellum.

To *Angracum Kindtianum*. A dwarf species, with racemes of small yellowish star-shaped flowers.

To *Eria longispicata*. *Aerides*-like in growth, with several erect spikes of small greenish flowers marked with red-brown.

To *Polystachya flexuosa*. A singular species from Uganda with the growth of a small, slender *Ansellia* about 1 foot in height and bearing an inflorescence a foot long with a bunch of white flowers with some purple marks on the labellum.

To *Epidendrum Lambeauanum*. A dwarf, tufted species of the *Nanodes* section, with terminal flowers, sepals and petals whitish and the labellum claret-red with lighter margin.

All the above shown by Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H.

Other Exhibits.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O. : new hybrids.

G. W. Jessop, Esq., Rawdon : *Satyrium coriifolium*.

Messrs. Sander, St. Albans : a group.

W. Waters Butler, Esq., Edgbaston : *Odontoglossum Uro-Skinnerii*.

ESTABLISHED
1804.



INCORPORATED
1809.

TELEGRAMS:
"HORTENSIA, LONDON."

TELEPHONE:
5363 WESTMINSTER.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

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1. NOTICE TO FELLOWS.

A few pages of Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on all subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number : **WESTMINSTER, 5363.**

"HORTENSIA, LONDON," is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be very greatly obliged for any of the following back numbers :—Vol. V., Part 1 ; Vol. VII., Part 2 ; Vol. X. ; Vol. XIII., Part 1 ; Vol. XVI., Parts 2 and 3 ; Vol. XVII., Parts 1 and 2 ; Vol. XVII., Parts 3 and 4 ; Vol. XIX., Part 1 ; Vol. XIX., Part 2 ; Vol. XX., Part 3 ; Vol. XXII., Part 3 ; Vol. XXII., Part 4 ; Vol. XXV., Part 3 ; Vol. XXVI., Part 4 ; Vol. XXVII., Part 1 ; Vol. XXVII., Part 4 ; Vol. XXVIII., Parts 3 and 4 ; and Vol. XXIX., Parts 1, 2, and 3. Also the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use or interest to Fellows would be appreciated, as applications for back numbers are repeatedly received.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments ; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellow, owing to the very large numbers, over 20,000, having to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Forms for the purpose may be obtained from the R.H.S. Offices at Vincent Square, Westminster, S.W. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society ; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London and County Bank, Westminster."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £, to be paid out of

such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 70 in the "Book of Arrangements," 1908.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the addresses insufficient, they are requested to inform the Secretary at once. Another use which all Fellows might make of this list is to consult it with reference to their friends' names, and if any of them are not found recorded therein they might endeavour to enlist their sympathies with the Society, and obtain their consent to propose them as Fellows forthwith. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL and the "Book of Arrangements."

9. NEW FELLOWS.

On March 6 last the Society completed its 104th year. Will all the Fellows do their best to extend the usefulness of the Society by enlisting the sympathy of all their friends and persuading them to join the ranks of the Society? A list of the privileges of Fellows will be found at page 16 in the "Book of Arrangements," and just a line addressed to the Secretary R.H.S., Vincent Square, Westminster, containing the name and address of the proposed new Fellow will suffice. Should it be preferred, the Secretary will, upon receipt of a postcard or letter giving the name and address of any persons likely to join the Society, write direct and invite them to allow their names to be proposed for election.

10. SHIRLEY POPPY SEED.

The Secretary regrets that he has this season only a very small stock of seed to give away. Last year he distributed over a thousand packets, and those who received it should have saved seed for themselves. This year there will be barely 500 packets available, but as far as it will go he will be pleased to send a packet to any Fellows who like to send to Rev. W. Wilks, Shirley Vicarage, Croydon, a stamped envelope ready addressed to themselves. The seed should be sown as early as possible in March.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

This is an offer made by the Secretary in his private capacity, and it causes much inconvenience when requests for seed are mixed up with letters sent to the office in London instead of as above directed. Applicants receiving no reply must kindly understand that the stock is exhausted; it will be impossible to write explanatory letters to all.

11. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially in:—

1. Increasing the number of Fellows.
2. Helping to swell the Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley.
3. Lectures with lantern slides.
4. Books are required to fill the gaps in the Library both at Vincent Square and at Wisley.
5. New and rare plants and seeds are wanted for the Garden and surplus roots for distribution to the Fellows.

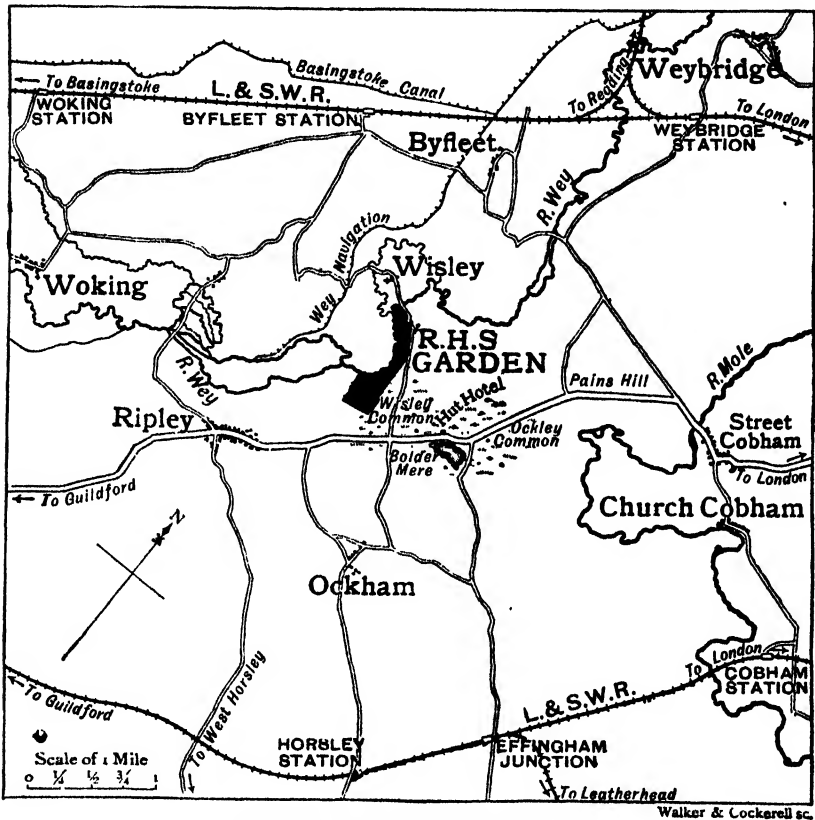
Thus there is plenty for all to do according to their individual liking: personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the ways above indicated.

12. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets from 9 A.M. till sunset, except on Sundays, Good Friday, and Christmas Day. Each Fellow's ticket admits three to the Gardens. The Public are not admitted. There is much of interest to be seen at Wisley throughout the year. The late Mr. G. F. Wilson's garden included a wild wood-garden, a bank of flowering shrubs, a series of ponds and pools, and a fine collection of Japanese Iris, Primulas, Lilies, Rhododendrons, &c. The Society has added a fine collection of the best varieties of fruit trees, of bamboos, of roses, and of ornamental trees and flowering shrubs, for the most part kindly given by the leading nurserymen. A very large sum of money has also been spent in the erection of a first-rate Meteorological Station, and a fine series of glass-houses; a dwelling-house for the Superintendent; a Cottage for the Fruit Foreman; and in establishing a complete system of water supply; on drainage works, and on road-making.

The Gardens are situated at Wisley, about 2 miles from Ripley in Surrey, and about $8\frac{1}{2}$ miles from Horsley and $5\frac{1}{2}$ miles from Weybridge, both stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.;

Effingham Junction, 7s.; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr.



POSITION OF THE SOCIETY'S GARDENS.

Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

13. TRIALS AT WISLEY IN 1909-10.

Trials of the following Fruits, Flowers, and Vegetables at the Wisley Gardens during 1909 have been arranged.

N.B.—Everything sent for trial *must be named*, and the name and address of the Sender attached.

Fruits.—Autumnal Raspberries. 15 Canes of each variety to be sent at once.

Flowers.—Tree Carnations. 4 plants of each variety to be sent in February, 2 for out-, 2 for in-doors.

Annals. Seed to be sent in January.

Garden Dahlias, Show and Cactus excluded. 2 plants of each variety to be sent in April.

Early-flowering outdoor Chrysanthemums. 2 plants of each variety to be sent in April.

Pentstemons. 2 plants of each variety to be sent in April or seed in January.

Vegetables.—Potatos, each variety must be labelled as being "early," "mid-season," or "late." 20 tubers of each to be sent by February. Also experiments with the same variety—viz. "The Factor" (20 tubers)—secured from as many varying sources as possible, under different soil and climatic conditions. Please send particulars of soil and climate.

Cauliflower. $\frac{1}{4}$ oz. of each variety.

Lettuce. $\frac{1}{4}$ oz. of each variety.

Kidney Beans. $\frac{1}{2}$ pint of each variety.

All parcels should be addressed :—

If sent by post : The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If by rail : The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.-W.R., with advice by post to the Superintendent.

14. THE WISLEY RESEARCH STATION.

The new Research Station and Laboratory at Wisley is now completed and work is in progress there. Mr. F. J. Chittenden has been appointed Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students. By the completion of this station a long-felt want has been met. In the United States, where so much good work has been done in this direction, all is paid for by the Government, but in this country we have to fall back on private individuals or on Societies.

15. STUDENTS AT WISLEY.

The Society admits a limited number of young men, not exceeding 22 years of age, to study Gardening at Wisley, where the training has been recently further developed by the erection of the Laboratory and Research Station. The curriculum now includes not only practical garden work in all the main branches of Horticulture, but also lectures, demonstrations, and elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c., may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can only enter at the end of September and at the end of March. Selected Students have also the advantage of attending certain of the Society's Shows and Lectures in London. It is generally easy to find these young men employment on the completion of their training ; in fact, the Council are quite unable to meet the demands for energetic, trustworthy young men ; but they *must all be workers*.

16. H.M. INSPECTOR'S REPORT.

The new Laboratory at Wisley was opened in July 1907, and the Students commenced work under the new scheme the following

September. The first year's work has therefore now terminated, and it is with no little satisfaction that the Council has received the very favourable report from the Board of Education to be found on page 303. The foresight of the Council in establishing, and the great public need of, such a school is already amply demonstrated by the fact that after so short a time from the date of opening the applications for admission far exceed the possible vacancies.

The report itself is most gratifying, and fully repays the Society for the time and attention and outlay which it has bestowed upon the school.

17. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution was established. The great majority also are of necessity *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive all the plants exactly as he has selected, but when the Ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganised by the sending-out of plants at any

later time in the year. All Fellows can participate in the annual distribution *following* their election.

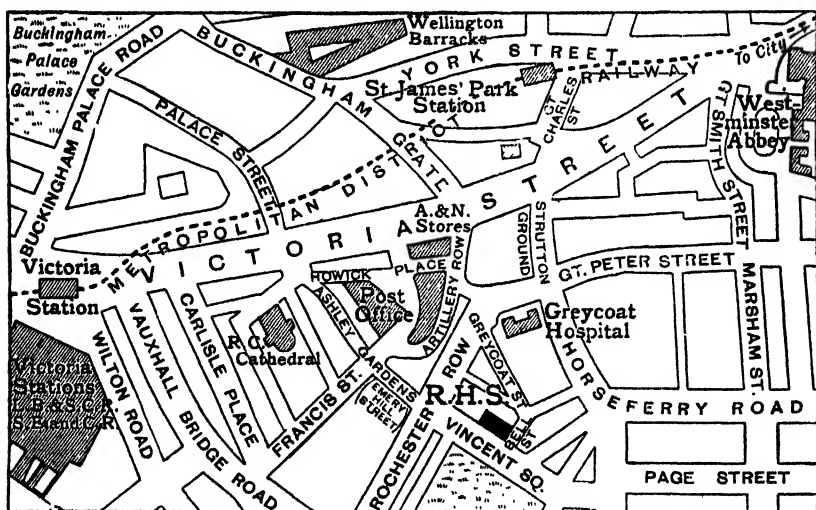
The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

18. THE SOCIETY'S HALL AND OFFICES.

The Royal Horticultural Hall and Offices are situated in Vincent Square, which lies straight through Ashley Gardens from Victoria Street,



POSITION OF THE SOCIETY'S HALL.

Westminster, and is about five minutes' walk from the Victoria and St. James's Park Stations.

19. LETTING OF HALL.

Fellows are earnestly requested to make known among their friends and among institutions that the ROYAL HORTICULTURAL HALL is available, twelve days in each fortnight, for Meetings, Shows, Exhibitions,

Concerts, Conferences, Lectures, Balls, Banquets, Bazaars, Receptions, and other similar purposes. The Hall has a floor surface of 18,000 square feet. It is cool in summer and warm in winter. For a Concert it will seat 1,500, or for a public meeting 1,800. It is undoubtedly the lightest Hall in London, and its acoustic properties are pronounced excellent by some of our greatest authorities. The charges, which are very moderate, include lighting, warming in winter or cooling the air in summer, seating, and the use of trestle-tabling and platform. The first floor, consisting of four fine rooms, may also be hired for similar purposes, either together with or separately from the Great Hall. This accommodation can also be divided up if desired. A long-felt want has now been met by the construction of a convenient kitchen in the basement, with lift connections to the eastern annexe and lecture room. For serving luncheons, &c., this will prove a great boon. Ample cloak-rooms for ladies and for gentlemen are available. In fact, the Hall is not only the most suitable Hall in London for special Shows of a high-class character, but it is also second only to the Queen's Hall and the Royal Albert Hall for the purposes of Concerts and Meetings. Reduction is made to Charities, and there are special terms for Societies kindred or allied to Horticulture. The regulations, &c., for hiring the Hall are printed in the "Book of Arrangements," and full particulars may be obtained on application to the Secretary R.H.S., Vincent Square, Westminster, S.W., with whom dates may be booked.

20. EXHIBITIONS, MEETINGS, AND LECTURES IN 1909.

A full programme for 1909 will be found in the "Book of Arrangements" for 1909, which will be issued at the end of January. It will be noticed that an Exhibition and Meeting is held in the Royal Horticultural Hall practically every fortnight throughout the year, and a short lecture on some interesting subject connected with Horticulture is delivered during the afternoon. Special Shows have also been arranged on days other than those of the Society's own Exhibitions.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (38) of halfpenny cards *ready addressed* to himself.

21. MEETINGS, 1909.

The following dates for the Society's 1909 Meetings have been fixed :— January 12 and 26; February 9 (Annual Meeting) and 23; March 9 (Spring Bulb Show) and 23; April 6 and 20 (Auriculas); May 4, 18 (Tulips), 25–27 (Spring Show); June 8 and 22 (the first Masters Memorial Lecture, by Professor Hugo de Vries); July 6, 7 (Holland House Show), 20, 21 (Carnations), and 23 (Sweet Peas); August 3, 17, and 31; September 14, 16 (Rose Show), and 28 (the second Masters Lecture, by Professor Hugo de Vries); October 12 and 26; November 9, 23, and 25–26 (Colonial Fruit Show) (or possibly 30 and 31); December 7, 8 (Carnations), and 21.

22. BRITISH GROWN FRUIT.

In consideration of the facts (1) that the annual Autumn Show of British Grown Fruit is every year practically a replica of the previous year's Show; (2) that many British grown fruits cannot possibly be shown (or shown in perfection) at any one Show of fixed date; and (3) that vegetables are somewhat neglected, the Council have decided to omit the great Autumn Show for one year, and in 1909 to substitute in its place a somewhat similar series of prizes for British grown fruit, but spread over the whole twelve months, so that every fruit may have a chance of being seen at its best. A schedule of prizes will therefore be found offered at every "fortnightly" Show at Vincent Square during 1909.

The following are offered in January and February, and for subsequent months Fellows must consult the "Book of Schedules," which will be issued in FEBRUARY 1909.

In all cases quality and flavour will have most consideration; the Judges to have option of tasting.

JANUARY 12.

LATE GRAPES. Class 3.—Three varieties, two bunches of each. Amateurs.

First Prize, £3; Second, £2.

Class 4.—Two bunches of one variety of Black Grape. Amateurs.

First Prize, 20s.; Second, 15s.

Class 5.—Two bunches of one variety of White Grape. Amateurs.

First Prize, 20s.; Second, 15s.

Class 6.—Two "Baby" baskets, one of Black and one of White Grapes. Trade growers.

First Prize, a Silver Knightian Medal.

Second Prize, a Silver Banksian Medal.

Class 7.—One "Baby" basket of any grape. To be judged for flavour.

First Prize, a Silver Knightian Medal.

Second Prize, a Silver Banksian Medal.

JANUARY 26.

SEA KALE. Class 3.—Two dishes, 12 heads in a dish. Amateurs.

First Prize, 15s.; Second, 10s.

RHUBARB. Class 4.—Two varieties, 12 stalks of each. Amateurs.

First Prize, 15s.; Second, 10s.

Class 5.—One bundle of 12 stalks. Amateurs.

First Prize, 10s.; Second, 7s. 6d.

ASPARAGUS. Class 6.—One bundle of 36 heads. Amateurs.

First Prize, 15s.; Second, 10s.

SALADS. Class 7.—Four varieties home-grown. Amateurs.

First Prize, 15s.; Second, 10s.

FORCED VEGETABLES. Class 8.—A collection of four kinds of forced vegetables to occupy a space 8 feet by 8 feet. Trade growers.

First Prize, a Silver Knightian Medal.

Second Prize, a Silver Banksian Medal.

FEBRUARY 9.

LATE DESSERT PEARS. Class 3.—Collection of four varieties. Amateurs.

First Prize, 20s.; Second, 15s.

Class 4.—Single Dish, one variety. Amateurs.

First Prize, 7s. 6d.; Second, 5s.

Class 5.—Collection not exceeding six varieties. Trade growers.

First Prize, a Silver Knightian Medal.

Second Prize, a Silver Banksian Medal.

Class 6.—Single Dish, one variety. Trade growers.

First Prize, a Silver Banksian Medal.

Second Prize, a Bronze Knightian Medal.

FEBRUARY 23.

LATE DESSERT APPLES. Class 3.—Collection of four varieties. Amateurs.

First Prize, 20s.; Second, 15s.

Class 4.—Single Dish, one variety. Amateurs.

First Prize, 7s. 6d.; Second, 5s.

Class 5.—Collection of six varieties. Trade growers.

First Prize, a Silver Knightian Medal.

Second Prize, a Silver Banksian Medal.

Class 6.—Single Dish, one variety. Trade growers.

First Prize, a Silver Banksian Medal.

Second Prize, a Bronze Knightian Medal.

23. BOTTLED BRITISH FRUITS, &c., SHOW.

The Annual Exhibition of British Bottled Fruits will probably be held on November 25 and 26, 1909, when it is hoped to see a still larger number of exhibits than this year. This is an Exhibition which should prove particularly attractive in domestic circles. Money Prizes and Medals are offered, and the new Class (No. 29 in the 1908 Schedule) will be decided by the Judges. The first prize is a Silver Cup. See "Book of Arrangements," 1908, page 68.

24. COLONIAL-GROWN FRUIT SHOW, 1909.

The President and Council of the Royal Horticultural Society will hold an Exhibition of Colonial-grown Fruits and Vegetables on November 25 and 26, or 30 and 31, 1909.

In holding this Show the Society's sole object is the advancement of the interest of the Colonies (a) by stimulating the production of better fruits; (b) by giving advice and assistance in the difficulties ever confronting Fruit Growers; and (c) by helping to inform the home market.

Fruit Growers in the Colonies are asked to assist their own future competition in the markets of Great Britain by sending exhibits to this Exhibition, invitations to which will be given to the Colonial and Government Offices, the Embassies, the leading London Fruit Merchants, Colonials on furlough, and others.

The Agents-General and other authorities are most kindly rendering every assistance, and we trust that both growers and shippers will do their best to send in Exhibits worthy of our Colonies, and to show what can be produced for the Home markets. No entrance fee or charge for space is made, and Tabling is also provided free of expense.

If desired any produce may be consigned direct to the Society and it will be stored in the cellars at Vincent Square and staged by the Society's officials; but the Society cannot undertake to repack and return any exhibits.

Particulars of the Show can be obtained from the Secretary R.H.S., Vincent Square, Westminster, S.W., by enclosing one penny stamp in order to cover the cost of postage.

25. SHOWS OF KINDRED SOCIETIES IN 1909.

The following dates have been fixed on which R.H.S. Fellows' tickets will admit:—

April 20.—Auricula and Primula Society.

May 18.—Tulip Society.

July 21.—Carnation and Picotee Society.

July 28.—Sweet Pea Society.

September 16.—Rose Society.

December 8.—Perpetual Flowering Carnation Society.

Copies of the Schedules for these Shows may be obtained from the Honorary Secretary of each Society. For names and addresses see above dates in the "Book of Arrangements," 1909.

26. FORCED BULB SHOW, MARCH 9, 1909.

The President and Council of the Society have decided to make the date March 9, 1909, a general one for the exhibit of collections of Forced Spring Bulbs, with a view to specially demonstrating which varieties (of Daffodils for instance) are best suited for forcing. Exhibits of small collections are invited from amateurs and the trade. R.H.S. Medals will be awarded according to merit. For Special Competitions on March 9, see under "Special Prizes" following:—

27. SPECIAL PRIZES, 1909.

(1) THE SHERWOOD CUP.

Mr. Sherwood, V.M.H., has intimated to the Council that in future the annual Cup which he gives to the Society shall be of the value of twenty guineas, instead of ten guineas as heretofore. It will be offered

at the Great Spring Show for a group of Orchids, and will be open to amateurs and trade alike—quality to have more weight than quantity. Ferns and other simple foliage plants may be used for greenery.

(2) HYACINTHS, TULIPS, AND DAFFODILS FORCED IN FIBRE.

Mr. Robert Sydenham has offered, and the Council have accepted, the following prizes to be competed for on March 9, 1909.

N.B.—For bulbs grown in moss fibre or similar material (not earth) and without drainage.

(a) Six single Hyacinths, in separate vases, not to exceed 6 inches in diameter, to be selected from any of the following twelve varieties: Balfour, General Vetter, Grand Lilas, Grand Maître, Innocence, Isabella, Jacques, Johan, Koh-i-noor, King of the Blues, La Grandesse, and Roi des Belges.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(b) Six vases of Tulips, vases not to exceed 7 inches, but no restriction as to the number of bulbs in a vase, to be selected from the following varieties: Duchess de Parma, Dusart, Fabiola, Joost van Vondel, Keizerskroon, Mon Tresor, Prince of Austria, Rose Gris de Lin, Thomas Moore, Van der Neer, Vermilion Brilliant, White Pottebakker.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(c) Six vases of Narcissi, vases not to exceed 7 inches in diameter, but no restriction as to the number of bulbs in a vase, to be selected from the following varieties: Bari Conspicuus, Campernelle Rugulosus, C. J. Backhouse, Emperor, Frank Miles, Lulworth, Leonie, Mad. de Graaff, Phyllis, Sir Watkin, Victoria, Waterwitch.

Prizes, 25s., 21s., 15s., 10s., 7s. 6d.

(3) FORCED HYACINTHS.

The Council have also accepted the following prizes from the Dutch Bulb Growers' Society at Haarlem to be competed for on March 9, 1909:—

Division I.—For Amateurs and Gentlemen's Gardeners.

(d) Eighteen Hyacinths, distinct.

1st Prize . . .	£6 6s.	4th Prize . . .	£3 8s.
2nd „ . . .	£5 5s.	5th „ . . .	£2 2s.
3rd „ . . .	£4 4s.	6th „ . . .	£1 1s.

(e) Twelve Hyacinths, distinct.

1st Prize . . .	£5 5s.	4th Prize . . .	£2 2s.
2nd „ . . .	£4 4s.	5th „ . . .	£1 1s.
3rd „ . . .	£3 8s.		

(f) Four pans containing Hyacinths, ten roots of one variety in each pan. The blooms of each pan to be of distinctly different colour from those of the other three pans.

1st Prize . . .	£4 4s.	3rd Prize . . .	£2 2s.
2nd „ . . .	£3 8s.	4th „ . . .	£1 1s.

Division II.—For Nurserymen.

(g) Collection of Hyacinths in pots, pans, or glasses.

Prize. The Gold Medal of the Dutch Bulb Growers' Society at Haarlem.

Regulations.—For Classes (d) and (e), each bulb must be in a separate pot (size optional).

Classes (d), (e), and (f) must all be single spikes; no spikes may be tied together.

Exhibitors in Class (d) may not compete in Class (e) or *vice versa*.

All the bulbs must have been forced entirely in Great Britain or Ireland.

(4) OUTDOOR DAFFODILS, APRIL 20.

Messrs. Barr and Sons have presented to the Society a Silver Cup, valued at £7 7s., as a prize for a group of Daffodil blossoms grown entirely outdoors, Polyanthus excluded, Doubles optional, but must include some of each of the other sections, and must contain at least thirty varieties distinct; at least three blooms of each must be shown. Not more than nine blooms of any one variety may be put up. To be staged in bottles, vases, or tubes not exceeding 8 inches in diameter at the top (inside measurement), and all the stems must touch the water. Quality of flower will count more than quantity, and correct naming and tasteful arrangement will be duly considered. Any hardy foliage may be used, Daffodil or otherwise. No prize will be awarded unless there are three competitors at least. Open to amateurs and gentlemen's gardeners only.

Past winners of this Cup may exhibit, but will not be eligible to receive the Cup more than once in three years. In the event of any such previous winner being adjudged "first," a medal will be awarded instead of the Cup, which will go to the next best exhibit, provided that the judges consider it to be of sufficient merit.

(5) CARNATION PRIZES.

The following Prize has been accepted from the Trustees of the "Veitch Memorial" at the Society's Fortnightly Meeting on December 8, 1908 :—

A Medal and £5 is offered for the best group of winter-flowering Carnations (either in pots or as cut flowers, or a combination of both), grown by the exhibitor, and occupying a space of 100 square feet. *Amateurs*.

A similar prize is again to be offered for Carnations at the Society's Exhibition on April 6, 1909.

28. LECTURES.

The new Lecture Room is fitted with an electric lantern of the most modern construction; electric current, gas, and water are laid on, and

every provision has been made for the illustration and delivery of Lectures.

Any Fellows willing to Lecture, or to communicate Papers on interesting subjects, are requested to communicate with the Secretary.

29. "THE MASTERS LECTURES."

Fellows will remember the intimate connection with the Society of the late Dr. Masters, F.R.S., who did much for horticulture by drawing constant attention to the various ways in which scientific discovery and research might be made serviceable to gardening; and it will also be remembered that a fund was established by subscriptions to perpetuate his memory in connection with the Society and to carry on in some degree his work of science in relation to gardening.

"The Masters Lectures" have accordingly been founded, and the first two are to be given during 1909 by the well-known Professor Hugo de Vries, of Amsterdam, on (a) "Masters' 'Vegetable Teratology'" (June 22), and (b) "The Production of Horticultural Varieties" (September 28).

30. EXAMINATIONS, 1909.

1. The Society will hold an examination on Monday, January 11, 1909, specially intended for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. This examination will be conducted in the Royal Horticultural Society's Hall, Vincent Square, Westminster, S.W. The entries close on January 1, 1909.

2. The Society's Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 21, 1909. The examination has two divisions, viz., (a) for Candidates of eighteen years of age and over, and (b) for Juniors *under* eighteen years. Candidates should send in their names not later than March 31. Full particulars may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1907 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Society is prepared to extend this examination to residents in the Colonies; and, at the request of the Government of the United Provinces of India, arrangements have been made to hold this examination in 1909—altered and adapted to the special requirements of India—at Saharanpur.

In connection with this examination a Scholarship of £25 a year for two years is offered by the Society to be awarded after the 1909 examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the

ages of 18 and 22 years, and that he should study gardening for one year at least at the Royal Horticultural Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Royal Horticultural Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

8. The Society will hold an Examination in Cottage Gardening on Wednesday, April 28, 1909. This examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test whatever of such competence. The general conduct of this examination will be on similar lines to that of the more general examination. Questions on Elementary Chemistry and Biology are now added to this examination.

Medals and Certificates are awarded and Class Lists published in connection with these examinations, and the Syllabus may be obtained on application to the Secretary R.H.S., Vincent Square.

31. EXAMINATIONS ABROAD.

On the invitation of the Government of the United Provinces of India, the "General Examination" of the Society in the Principles of Horticulture is to be slightly modified so as to fulfil their local requirements, and a first examination will be held in April 1909 at Saharanpur. This suggests that possibly other countries and districts may feel it desirable to enter candidates for a similarly modified examination, in which case the Council would doubtless be prepared to organize it.

The examiners are leading horticulturists in England, and for examinations abroad they will be assisted by experts acquainted with the special horticultural conditions of the various countries desiring to adopt the Society's tests.

32. INFORMATION.

Fellows may obtain information and advice free of charge from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary R.H.S., Vincent Square, Westminster, S.W. Where at all practicable, it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings so as to be laid before the Scientific or other Committees at once.

33. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and

advises at the following cost, viz., a fee of £8. 8s. for one day (or £5. 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Gardens. Gardens can only be inspected at the *written* request of the owner.

34. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of all local Horticultural, Floral, and Gardening Societies by a scheme of affiliation to the R.H.S. Since this was initiated, no less than 200 Societies have joined our ranks, and that number is steadily increasing.

To the privileges of Affiliated Societies have recently been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen copy of a Card which the Council have prepared for the use of Affiliated Societies wishing to have a suitable Card for Certificates, Commendations, &c. It can be used for Fruit or Flowers or Vegetables. Price 3s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz., Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered—price 6d. each.

35. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has recently been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Mutual Improvement Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies, and thus generally to advance the aims and objects of horticulture.

A list of lecturers and their subjects, and also a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary R.H.S., price 8d.

The Secretary of the Society will be very glad to hear from any competent lecturers who are willing to lecture to such Societies that he may enrol them in the Register of Lecturers and bring them into touch with Societies requiring assistance. Others may like to send to him written lectures (with or without lantern slides), that he may have them printed for circulation among these Societies.

Lantern slides on horticultural topics are urgently needed, and their gift will be very much appreciated.

36. CLASSIFICATION OF DAFFODILS.

At the request of the Daffodil Committee the Council recently appointed a Committee to consider the best way of avoiding the confusion, and consequent disputes, likely to arise from the recent multitudinous crossing, recrossing, and intercrossing of the old Divisions of Magni-Medio- and Parvi-coronati. The Committee have delivered their Report instituting an entirely new system of classification, which the Council have (with slight modifications) adopted and confirmed, and ordered to be used at all the Society's Shows. The Report contains a list of every Daffodil known to the Committee, together with the name of the raiser as far as it could be discovered, each flower known being allotted to its appropriate class. The Report has been printed in a handy book form, and can be obtained from the Society's Office, Vincent Square, at a cost of 1s.

37. COLOUR CHART.

Hardly a gardener or florist exists who has not at times longed for a COLOUR CHART—that is to say, for a standard of reference whereby he could himself name, or recognize, or convey to a friend at a distance, the *exact* shade of colour of a flower he desired to procure or had seen advertised, or wished to commend to a friend. Take, for example, the word “crimson,” what a multitude of colours and shades it may be made to include! Some, very beautiful; some, horrible concoctions of red and blue crudely combined.

The Council of the Society have long felt the need of such a Colour Chart, but the huge expense of producing it has hitherto deterred them from issuing it.

Not long since a most admirable chart, containing more than 1,450 shades of colour between white and black, was published in France at the instance of the French Chrysanthemum Society, the price in England being £1 1s. net, and by it it is now possible to *exactly* recognize or describe to a friend or purchaser at a distance the precise colour of any possible flower. You may have met with an Azalea, for instance, which greatly strikes your fancy; you take out your chart and match its shade, and describe it to your friend or your nurseryman as, “Colour: Apricot, p. 53, shade 3,” and he turns to his chart and sees *exactly* what it is you want or describe. Or you want to make someone understand the exact shade of a rose in the way of “Andersoni,” and you need only say, “Rosy pink, p. 118, shade 4,” and your correspondent turns to his chart and sees in a moment exactly what it is you want to describe. Or a nurseryman, having raised a new variety, can by simply quoting “Colour Chart, p. —, shade —,” exactly represent to his customers the colour-beauty of his new introduction.

The Council recognizing both the excellence and the usefulness of this chart, the idea at once occurred, Could it not be adopted as an

International Standard, so that all lovers of flowers all over the world could accurately and exactly describe to one another (no matter how far away or speaking what language) the colour and shade of any particular flower they refer to? There seemed no other difficulty than the somewhat prohibitive cost of £1 1s. net. But difficulties only exist to be overcome, and by undertaking to be responsible for a very large number, the Society is now in a position to offer this Chart to its Fellows at the reduced cost of 14s. 6d., for which price it can be obtained at the Society's Offices, Vincent Square, or it can be sent free by post for 15s. ; but in all cases a cheque or postal order must be sent beforehand.

This Chart will, of course, be found vastly useful for many other purposes; for example, a lady wishing to match a certain shade has only to refer her dressmaker to such and such a colour on p. —, shade —, and it can be infallibly matched. An artist wishing to describe the colour of the sky on a certain sundown, can do so exactly by reference to the chart. And in many other like ways it must prove generally useful, containing as it does every possible shade of colour between black and white.

The Council hope that Fellows will avail themselves freely of this offer, as unless a very large number of copies are purchased a great loss will accrue to the Society.

38. MONOGRAPH ON FUNGOID PESTS.

The attention of Fellows is directed to a handsome volume recently published by the Society on Fungoid Pests of Cultivated Plants, by Dr. M. C. Cooke, V.M.H. It consists of 280 pages of letterpress, and is illustrated with 24 coloured plates, containing figures of 860 different fungoid attacks, and 28 woodcuts. The work is divided under the headings of Pests of the Flower Garden, of Vegetables, of Fruit, of the Vinery and Stove, of the Ornamental Shrubbery, of Forest Trees, and of Field Crops. These are followed by a Chapter on Fungicides, which explains very clearly how to make the different washes and sprays, and also gives the proportions in which the various ingredients should be used.

Each pest is described separately, and means for its prevention or eradication are given, and the whole work is written so as to interest and instruct the cultivator in the simplest and most practical manner. The volume, as published, is half-bound in calf, as it was considered probable that it would form the text-book on the subject for very many years to come; and it thus makes an admirable school prize or gift to a gardener or student of nature. Price 6s., R.H.S. Office, Vincent Square.

"No one whose plants are subject to fungoid attacks—and whose are not?—should be without this book; for not only can they by its use identify the disease at once, but they are also told both how to treat it and overcome it, and also how to make the different washes and sprays which the different classes of fungoid attacks require."

39. RULES FOR JUDGING—1909 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have again been further revised and considerably modified from the experience gained during the last few years. Special attention is drawn to the amended Rule defining "an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. The "pointing" recommended for fruits and vegetables has also been considerably amended, and the terms "annuals and biennials" further explained. The secretaries of local Societies are therefore strongly advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d. addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

40. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the quite new varieties of Fruits, which promise well, but are not yet sufficiently long proved to be recommended for general planting.

Copies of this most valuable little pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2d., or 25, 2s.; 50, 3s.; 100, 4s.

41. NICHOLSON MEMORIAL FUND.

The Council have been requested to raise a fund for the establishment of a permanent memorial of the late Mr. Geo. Nicholson, V.M.H., F.L.S. With this they most cordially agree. There are few, if any men, to whom the present generation of gardeners owes a deeper obligation than to the author of "The Dictionary of Gardening," a work which "has done more towards the standardization of plant names and developing an interest in horticulture than anything published since Loudon," 1829.

Mr. Nicholson was for many years a most valued member of the Scientific Committee of our Society. He also took a very active part and keen interest in the re-establishment of examinations by the Society, and himself acted as one of the examiners. It is in view of this last point and after carefully estimating the amount likely to be subscribed,

that the Council propose to establish a "Nicholson Prize," to be awarded annually after examination to the students at Wisley.

Subscriptions should be sent addressed "The Nicholson Prize Fund, R.H.S. Office, Vincent Square, London," and cheques and postal orders made payable to "The Royal Horticultural Society," crossed "London and County Bank."

42. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

FELLOWS' PRIVILEGES OF CHEMICAL ANALYSIS.

(Applicable only to the case of those Fellows who are not engaged in any Horticultural Trade, or in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of charges for Chemical Analysis to Fellows of the Society being *bond fide* Gardeners or Amateurs.

These privileges are applicable only when the Analyses are for *bond fide* horticultural purposes, and are required by Fellows for their own use and guidance in respect of gardens or orchards in their own occupation.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Fellow applying for them, and must not be used for the information of other persons, or for commercial purposes.

Gardeners, when forwarding samples, are required to state the name of the Fellow on whose behalf they apply.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

When applying for an analysis, Fellows must be very particular to quote the number in the following schedule under which they wish it to be made.

No.

1. An opinion on the purity of bone-dust (each sample) 2s. 6d.
2. An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged 5s.
3. An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged 10s.
4. An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged 5s.
5. An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime and ammonia, together with an opinion as to whether it be worth the price charged 10s.
6. An analysis of bone-dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged 10s.
7. Determination of potash in potash salts, compound manures, &c. 7s. 6d.
8. An analysis of compound artificial manures, animal products, refuse substances used for manure, &c. from 10s. to £1
9. An analysis of limestone, showing the proportion of lime 7s. 6d.
10. Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime 10s.
11. Complete analysis of a soil £8
12. Analysis of any vegetable product 10s.
13. Determination of the "hardness" of a sample of water before and after boiling 5s.
14. Analysis of water of land-drainage, and of water used for irrigation £1
15. Analysis of water used for domestic purposes £1 10s.
16. Consultation by letter 5s.

Letters and samples (postage and carriage prepaid) should be addressed to the Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, 22 Tudor Street, New Bridge Street, London, E.C.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

Instructions for selecting, drawing, and sending samples for analysis will be found in the Society's "Book of Arrangements," or can be obtained on application to the Society's Office, Vincent Square, S.W.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

SEPTEMBER 1, 1908.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

Fellows elected (12).—Henry Alty, C. Stafford Anderson, Mrs. Langton Barnard, Mrs. Carthew, Michael Gutteridge, Mrs. Bryan Hook, W. B. Little, R. Machin, Robert R. Mawson, W. D. Scott-Moncrieff, S. Sharman, Hon. Mrs. Yorke.

A lecture on "Garden Design : Comparative, Ethical, and Historical" was given by Mr. Thomas H. Mawson, Hon. A.R.I.B.A. (see p. 361).

GENERAL MEETING.

SEPTEMBER 15, 1908.

Mr. JOSEPH CHEAL in the Chair.

A second lecture on "Garden Design : Comparative, Ethical, and Historical" was given by Mr. Thomas H. Mawson, Hon. A.R.I.B.A. (see p. 373).

GENERAL MEETING.

SEPTEMBER 29, 1908.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

Fellows elected (62).—J. F. Albright, E. W. Ashley, A.C.P., Mrs. W. W. Ashton, M. Bevan, F. Bouskell, J. Bray, A. Calderbank, Hugh S. Charrington, Mrs. Talbot Clifton, Mrs. E. Clifton-Brown, G. H. Cole, C. Collingham, Mrs. D. M. Collins, G. S. Crisford, F.I.A., H. U. Cunningham, H. Dickson, Mrs. Dyer, E. B. Gascoyne, Mrs. Alex. Gilroy, Mrs. Frank Goldring, W. T. Gould, C. E. Gunther, W. Hemmant, Percy Honri, J. G. Howlett, W. S. Irving, T. J. James, Mrs. J. M. John, Mrs. M. A. Jones, W. Joynson-Hicks, M.P., Mrs. C. Ker, T. Kirby, F. Longley, Mrs. Luxmoore, Miss Maunsell, Miss I. Menzies, Mrs. Hunter Muskett, C. Newman, O. O. Newman, Mrs. Oldfield, T. Oxley, T. J. Parker, Hon. Mrs. Parsons, Dr. Leslie Paton, Mrs. Loraine Pears, Mrs. F. Reynard,

Mrs. G. A. Riddell, E. D. Sewell, R. E. Shawcross, J. R. Smith, Miss E. A. Strange, J. Stapleton, J. Woodhouse Stubbs, Mrs. Charles Symonds, G. W. Thomson-Price, W. Arnold Viccars, Miss J. F. Whiffen, T. J. Whiffen, H. C. Willock-Pollen, Mrs. Kershaw Wood, J. H. Woolley, Mrs. Yate.

Fellows resident abroad (6).—Baron von Ambrozy (U.S.A.), J. D. Eisele (U.S.A.), F. R. Field (New Zealand), W. B. R. Goulden (S. Africa), D. Lumsden (U.S.A.), Dr. S. Adams Robinson (U.S.A.).

Associates (8).—Miss F. Cross Brown, C. E. Compson, W. H. Ward.

Societies affiliated (2).—Keston Horticultural Society, Saltaire and Shipley Rose Society.

A lecture on "The Practice of Garden Design," was given by Mr. T. H. Mawson, Hon. A.R.I.B.A. (see p. 384).

GENERAL MEETING.

OCTOBER 13, 1908.

Mr. PERCY F. BUNYARD, F.Z.S., in the Chair.

Fellows elected (86).—Mrs. Austen, Mr. S. Barnes, Miss J. S. Bidwell, Mrs. George Bowlby, Hon. Mrs. Marshall Brooks, J. Browning, F. Chancellor, Basil R. Coysh, Mrs. Dent, Mrs. Algernon Fawkes, G. B. Finch, Mrs. F. W. Gibson, Bernard Godfrey, A. A. Hudson, G. F. Jeal, H. H. Jones, Mrs. G. E. Kirk, A. Matthews, G. Montagu, Miss M. Nickalls, J. Palmer, C. H. Page, T. A. Phillips, Mrs. Remington Robert, E. Vivian Rowe, H. B. Salter, Mrs. R. Schön, Col. F. W. Scudamore, Miss M. M. Skues, M.A., P. E. Thorpe, C.B., LL.D., F.R.S., Mrs. Tyler, Capt. B. Walsh, Mrs. J. B. Waters, T. H. Watts, Miss E. Webster, Mrs. Zambra.

Society affiliated (1).—Stony Stratford Horticultural Society.

A lecture was given on "The Influence of Geology on Horticulture," by Mr. Cecil H. Hooper, M.R.A.C. (see p. 394).

FIFTEENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

HELD AT THE SOCIETY'S HALL, VINCENT SQUARE, S.W.,
OCTOBER 15 AND 16, 1908.

John Lee, Esq., Bebington, kindly sent 10s. 6d. and Mrs. McLaren, 56 Ashley Gardens, £1. 1s. towards the Prize Fund for this Show.

THE JUDGES.

The following gentlemen kindly acted as Judges, and deserve the best thanks of the Society for their oftentimes very difficult work, viz.—

Allan, W., Gunton Park Gardens, Norwich.

Arnold, T., Cirencester Park Gardens, Gloucester.

Bacon, W. H., Mote Park Gardens, Maidstone.

Barnes, N. F., Eaton Gardens, Chester.

Barnes, W., Bearwood Gardens, Wokingham.

Basham, J., Bassaleg, Newport, Mon.
 Bates, W., Cross Deep Gardens, Twickenham.
 Beckett, E., V.M.H., Aldenham House Gardens, Elstree.
 Blick, C., Warren House Gardens, Hayes, Kent.
 Bowerman, J., Hackwood Park Gardens, Basingstoke.
 Challis, T., V.M.H., Wilton House Gardens, Salisbury.
 Cheal, J., Crawley, Sussex.
 Coomber, T., The Hendre Gardens, Monmouth.
 Cornford, J., Quex Park Gardens, Birchington.
 Crump, W., V.M.H., Madresfield Court Gardens, Malvern.
 Davis, J., Glebelands Gardens, S. Woodford.
 Dean, Alex., V.M.H., 62 Richmond Road, Kingston.
 Divers, W. H., Belvoir Castle Gardens, Grantham.
 Doe, J., Rufford Gardens, Ollerton, Notts.
 Douglas, J., V.M.H., Great Bookham, Surrey.
 Earp, W., Bayham Abbey Gardens, Lamberhurst.
 Fielder, C. R., North Mymms Park Gardens, near Hatfield.
 Foster, C., University College, Reading.
 Fyfe, W., Lockinge Park Gardens, Wantage.
 Goodacre, J. H., Elvaston Castle Gardens, Derby.
 Jaques, J., Grey Friars, Chorley Wood, Herts.
 Lyne, J., Foxbury Gardens, Chislehurst.
 McIndoe, J., V.M.H., 8 Hythe Street, Dartford.
 Markham, H., Wrotham Park Gardens, High Barnet.
 Molyneux, E., V.M.H., Swanmore Gardens, Bishop's Waltham.
 Mortimer, S., Rowledge, Farnham, Surrey.
 Parr, H., Trent Park Gardens, New Barnet.
 Paul, G., J.P., V.M.H., Cheshunt, Herts.
 Pearson, A. H., The Hut, Lowdham, Nottingham.
 Pope, W., Newtown, Thatcham, Berks.
 Poupart, W., Marsh Farm, Twickenham.
 Rivers, H. Somers, Sawbridgeworth.
 Ross, C., Welford Park Gardens, Newbury.
 Salter, C. J., Normanhurst Gardens, Rusper, Horsham.
 Smith, J. R., Addington Gardens, Croydon.
 Veitch, P. C. M., J.P., New North Road, Exeter.
 Vert, J., Audley End Gardens, Saffron Walden.
 Walker, J., The Farm, Ham Common, Surrey.
 Ward, A., Godinton Gardens, Ashford.
 Weston, J. G., Eastwell Park Gardens, Ashford.
 Woodward, G., Barham Court Gardens, Teston.

THE REFEREES.

The following gentlemen very kindly held themselves at the disposal of the Society to act in conjunction with any of the Judges as Referees if required, viz.—

Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
 Hudson, James, V.M.H., Gunnersbury House Gardens, Acton, W.
 Thomas, Owen, V.M.H., 25 Waldeck Road, West Ealing.

OFFICIAL PRIZE LIST.

(The address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.)

DIVISION I.

Fruits grown under Glass or otherwise.

Open to Gardeners and Amateurs only.

NOTE.—Exhibitors can compete in one Class only of Classes 1, 2 and of Classes 3, 4.

Class 1.—Collection of 9 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety.

First Prize, Silver Cup and £5; Second, £5; Third, £3.

1. The Earl of Harrington, Elvaston (gr. J. H. Goodacre).
2. C. R. Adeane, Esq., Babraham, Cambridge (gr. R. Alderman).
3. No award.

Class 2.—Collection of 6 dishes of Ripe Dessert Fruit:—4 kinds at least; only 1 Melon, 1 Black and 1 White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety. Pines excluded.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

1. W. M. Price, Esq., The Node, Welwyn (gr. T. Pateman).
2. Lord Howard de Walden, Saffron Walden (gr. J. Vert).
3. { Mr. E. Neal, Tilgate Gardens, Crawley.
Lord Belper, Kingston, Derby (gr. W. H. Cook). } equal.

Class 3.—Grapes, 5 distinct varieties, 3 bunches of each, of which two at least must be White.

Prizes given to the Society by the Veitch Memorial Trustees.

First Prize, Silver Medal and £10; Second, Bronze Medal and £5;
Third, Bronze Medal.

1. The Earl of Harrington.
2. H. J. King, Esq., Eastwell Park, Kent (gr. J. G. Weston).
3. Sir W. D. Pearson, Bart., Paddockhurst, Worth (gr. A. B. Wadds).

Class 4.—Grapes, 4 varieties, selected from the following: 'Madresfield Court,' 'Mrs. Pince,' 'Muscat Hamburg,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg,' 2 bunches of each.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

No entry.

Class 5.—Grapes 'Black Hamburg,' 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. Lord Savile, Rufford Abbey, Ollerton (gr. J. Doe).
2. Mr. E. Neal.
3. The Marquess of Salisbury, Hatfield (gr. H. Prime).

Class 6.—Grapes 'Mrs. Pince,' 2 bunches.

First Prize, £1. 10s. ; Second, £1.

1. Lord Savile.
2. O. E. Avigdor-Goldsmid, Esq., Tonbridge (gr. C. Earl).

Class 7.—Grapes 'Alicante,' 2 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. W. G. Raphael, Esq., Englefield Green (gr. H. H. Brown).
2. C. T. Cayley, Esq., Tunbridge Wells (gr. H. Poulton).
3. H. Andrews, Esq., Toddington Manor, Gloucester (gr. J. Tooley).

Class 8.—Grapes 'Madresfield Court,' 2 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. Lord Savile.
2. F. R. Rodd, Esq., Trebartha Hall, Launceston (gr. F. Billings).
3. The Marquess of Salisbury.

Class 9.—Grapes, any other Black Grape, 2 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. Col. Hon. Chas. Harbord, Norwich (gr. W. Allan).
2. W. G. Raphael, Esq.
3. Sir W. L. Greenwell, Bart., Marden Park, Surrey (gr. W. Lintott).

Class 10.—Grapes 'Muscat of Alexandria,' 2 bunches.

First Prize, £2 ; Second, £1. 5s. ; Third, 15s.

1. The Earl of Harrington.
2. Sir E. Durning-Lawrence, Bart., King's Ride, Ascot (gr. W. Lane).
3. W. G. Raphael, Esq.

Class 11.—Grapes, any other White Grape, 2 bunches.

First Prize, £1. 10s. ; Second, £1 ; Third, 10s.

1. A. Benson, Esq., Merstham (gr. H. Cornish).
2. Sir W. D. Pearson, Bart.
3. No award.

Class 12.—Grapes, 2 bunches of any Frontignan varieties.

First Prize, £1. 10s. ; Second, £1.

No entry.

Class 13.—Collection of Hardy Fruits, in a space not exceeding 12 × 8 :—80 dishes distinct, grown entirely in the open ; not more than 12 varieties of Apples or 8 of Pears.

First Prize, The Hogg Medal and £8 ; Second, £2 ; Third, £1.

1. Lieut.-Col. Borton, Hunton (gr. J. Whittle).
2. Sir Marcus Samuel, Bart., Maidstone (gr. W. H. Bacon).
3. Major Powell-Cotton, Quex Park, I. of Thanet (gr. F. Cornford)

DIVISION II.

Open to Nurserymen only.

Nurserymen and Market Growers must exhibit as individuals or as firms. *They must have actually grown all they exhibit.* Combinations of individuals or firms are not allowed, nor collections of produce from districts.

Nurserymen and Market Growers desiring to exhibit at this Show must make application for space as under Class 14 or 15; 16; 17 or 18; 19. No other spaces but the above can be allotted. Exhibitors can only enter in one of Classes 14 and 15; or in one of 17 and 18; and Exhibitors in 17 and 18 may not show in Class 19.

Nurserymen and Market Growers may adopt any method of staging they desire, subject to the following regulations: (a) The number of fruits is not limited, but the baskets or dishes must not exceed 15 inches in diameter if circular, or 19 × 15 if rectangular, unless they be sieves or half-sieves; (b) Duplicate trees are permitted in Class 16, but *not duplicate baskets or dishes* of fruit in any of the Classes; (c) No trees are admissible in Classes 14 and 15; (d) The fruit in Exhibits under Classes 14 and 15, 17 and 18 must in no case be raised higher than 3 feet above the table. The use of berries and foliage plants is allowed for decoration, but not flowers.

No awards of any sort will be made to Nurserymen and Market Growers who do not conform to the above regulations.

IMPORTANT.—Nurserymen and Market Growers having entered and finding themselves unable to exhibit are *particularly* requested to give four days' notice to the Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey. Telegraphic Address—"Hortensia, Ripley."

Allotment of table-space will be made on the following scale:—

For Fruit grown entirely out of doors.

Class 14.—24 feet run of 6 feet tabling.

First Prize, Gold Medal; Second, Silver-gilt Knightian Medal; Third Silver-gilt Banksian Medal.

1. Messrs. Bunyard, Maidstone.
2. Messrs. Cannell, Eynsford.
3. Messrs. J. Cheal, Crawley.

Class 15.—16 feet run of 6 feet tabling.

First Prize, Silver-gilt Knightian Medal; Second, Silver-gilt Banksian Medal; Third, Silver Knightian Medal.

1. Mr. W. Tayler, Hampton.
2. Messrs. W. Seabrook, Chelmsford.
3. Messrs. Laxton, Bedford.

For Orchard-house Fruit and Trees.

Class 16.—24 feet by 6 feet of stage. Grapes excluded.

No entry.

DIVISION III.

Open to Market Growers only.

Class 17.—18 feet run of 6 feet tabling.

First Prize, £2; Second, £1. 10s.; Third, £1.

1. No award.
2. Horticultural College, Swanley.
3. No award.

Class 18.—12 feet run of 6 feet tabling.

First Prize, £2; Second, £1. 10s.; Third, £1.

1. Mr. G. H. Deane, Sittingbourne
2. Mr. O. G. S. Croft, Withington.
3. Messrs. Lobjoit, Heston.

Class 19.—Apples, 12 dishes distinct, 6 Cooking, 6 Dessert; Exhibitors in Classes 17 and 18 not admissible.

First Prize, £2; Second, £1. 10s.; Third, £1.

1. Mr. H. T. Mason, Hampton Hill.
2. Mr. A. E. Mason, Hampton Hill.
3. Miss K. M. Courtauld, Colne Engaine.

DIVISION IV.

Fruits grown entirely in the Open Air—except Class 82.

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

Exhibitors of Apples or Pears in Division IV. are excluded from Division VI.

NOTE.—Exhibitors can compete in one Class only of the Classes 20, 21, 22; or of 25, 26, 27, 28.

Class 20.—Apples, 24 dishes distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, Silver Hogg Memorial Medal and £3;
Second, £3; Third, £2.

1. Lieut.-Col. Borton.
2. Sir Marcus Samuel, Bart.
3. J. E. Williams, Esq., Tring (gr. F. G. Gerrish).

Class 21.—Apples, 18 dishes distinct, 12 Cooking, 6 Dessert. The latter to be placed in the front row.

First Prize, Silver-gilt Medal, presented by the Worshipful Company of Fruiterers, and £3; Second, £2; Third, £1.

1. C. R. Adeane, Esq.
2. Major Powell-Cotton.
3. O. E. Avigdor-Goldsmid, Esq.

Class 22.—Apples, 12 dishes distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2; Second, £1; Third, 15s.

1. Rev. T. McMurdie, Woburn Park, Weybridge (gr. A. Basile).
2. Lord A. Butler, Hunton (gr. F. H. Skinner).
3. No award.

Class 23.—Cooking Apples, 6 dishes distinct.

First Prize, £1; Second, 15s.; Third (extra), 10s.

1. Lieut.-Col. Borton.
2. Sir Marcus Samuel, Bart.
3. C. R. Adeane, Esq.

Class 24.—Dessert Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s.

1. Lieut.-Col. Borton.
2. Sir Marcus Samuel, Bart.

Class 25.—Dessert Pears, 18 dishes, distinct.

First Prize, Silver Hogg Memorial Medal and £2 ;

Second, £2 ; Third, £1.

1. F. A. White, Esq., East Grinstead (gr. W. J. Finch).
2. Sir Marcus Samuel, Bart.
3. Lieut.-Col. Borton.

Class 26.—Dessert Pears, 12 dishes, distinct.

First Prize, Silver Medal presented by the Fruiterers' Company and £2 ;

Second, £1 ; Third, 15s.

1. Rev. T. McMurdie.
2. W. M. Price, Esq.
3. Lord A. Butler.

Class 27.—Dessert Pears, 9 dishes, distinct.

First Prize, £1. 10s. ; Second, 17s. 6d.

No entry.

Class 28.—Dessert Pears, 6 dishes, distinct.

First Prize, £1 ; Second, 15s.

1. Hon. Whitelaw Reid, Ampthill (gr. G. Mackinley).
2. A. Benson, Esq.

Class 29.—Stewing Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s.

1. Major Powell-Cotton.
2. Rev. H. Bull, Westgate (gr. F. King).

Class 30.—Peaches grown entirely out of doors, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. The Marquess of Northampton, Castle Ashby (gr. A. R. Searle).
2. F. A. English, Esq., Addington (gr. J. R. Smith).

Class 31.—Nectarines grown entirely out of doors, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. The Marquess of Northampton.
2. No award.

Class 32.—Plums grown under Glass, 3 dishes, distinct.

First Prize, £1 ; Second, 10s.

1. The Marquess of Northampton.
2. Lord Howard de Walden.

Class 33.—Plums (outdoors), 3 dishes, distinct.

First Prize, 15s. ; Second, 10s.

1. Lord Howard de Walden.
2. The Marquess of Northampton.

Class 34.—Plums, 1 dish of Coe's Golden Drop.

First Prize, 7s. ; Second, 5s.

1. Sir C. E. Hamilton, Bart., Sandy (gr. T. W. Birkinshaw).
2. Lord Foley, Claygate (gr. H. C. Gardner).

Class 35.—Plums, 1 dish of any other Dessert variety.

First Prize, 7s. ; Second, 5s.

1. Lord Howard de Walden.
2. Mrs. A. Goodhart, Inkpen (gr. S. Lawrence).

Class 36.—Plums, 1 dish of Cooking of one variety. .

First Prize, 7s. ; Second, 5s.

1. Lord Howard de Walden.
2. The Marquess of Northampton.

Class 37.—Damsons, or Bullaces, 3 dishes, distinct.

First Prize, 10s. ; Second, 7s. 6d.

No entry.

Class 38.—Morello Cherries, 50 fruits.

First Prize, 7s. ; Second, 5s.

1. J. E. Williams, Esq.
2. Sir Marcus Samuel, Bart.

Class 39.—Grapes grown out of doors, Basket of about 6 lb. weight.

First Prize, £1 ; Second, 10s.

1. F. A. English, Esq.
2. G. E. Crisp, Esq., Chelsham Road, Croydon.

DIVISION V.

Special District County Prizes.

Open to Gardeners and Amateurs only.

(In this Division all Fruit must have been grown in the Open.)

N.B.—Exhibitors in Division V. must not compete in Divisions II. or III., or in Classes 1, 2, 3, 4, 13, 20, 21, 22, 25, 26, 27.

Class AA.—Apples, 6 dishes, distinct, 4 Cooking, 2 Dessert.

1st Prize, £1 and 3rd class Single Fare from Exhibitor's nearest railway station to London ; * 2nd Prize, 15s. and Railway Fare as above.*

Class BB.—Dessert Pears, 6 dishes, distinct.

1st Prize, £1. 10s. and Railway Fare as above ; * 2nd Prize, £1 and Railway Fare as above.*

The above two classes, Nos. AA and BB, are repeated eleven times, and Exhibitors must enter for them thus : " Class AA 41 " or " BB 42," and so on, to make it quite clear whether they mean Apples or Pears.

* In the event of the same Exhibitor being successful in both classes AA and BB only one Railway Fare will be paid ; and no Railway Fare will be paid if the fruit is sent up for the Society's officers to unpack and stage.

Class 40.—Open only to Kent Growers.

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|-----|---|
| AA. | { 1. W. E. S. E. Drax, Esq., Wye (gr. J. Bond). |
| | 2. C. A. Morris-Field, Esq., Sevenoaks (gr. R. Edwards). |
| BB. | { 1. Dowager Lady Hillingdon, Sevenoaks (gr. J. Shelton), |
| | 2. C. A. Morris-Field, Esq. |

Class 41.—Open only to Growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

- AA. { 1. B. H. Hill, Esq., Crediton (gr. G. Lock).
 { 2. F. J. B. Wingfield-Digby, Esq., Sherborne (gr. T. Turton).
 BB. { 1. F. J. B. Wingfield-Digby, Esq.
 { 2. Sir E. G. Loder, Bart., Horsham (gr. W. A. Cook).

Class 42.—Open only to Growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

- AA. { 1. C. Gurney, Esq., Biggleswade (gr. A. Carlisle).
 { 2. Captain Farwell, Burnham (gr. W. Hutt).
 BB. { 1. J. B. Fortescue, Esq., Maidenhead (gr. C. Page).
 { 2. H. Andrews, Esq., Winchcombe (gr. J. Tooley).

Class 43.—Open only to Growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

- AA. { 1. Major Petre, Norwich (gr. G. D. Davison).
 { 2. Hon. W. Lowther, Wickham Market, Suffolk (gr. A. Andrews).
 BB. { 1. Major Petre.
 { 2. Col. Hon. Chas. Harbord.

Class 44.—Open only to Growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

- AA. { 1. John Lee, Esq., Bebington.
 { 2. The Duke of Rutland, Belvoir Castle, Grantham (gr. W. H. Divers).
 BB. { 1. The Marquess of Northampton.
 { 2. The Duke of Rutland.

Class 45.—Open only to Growers in Worcester, Hereford, Monmouth, Glamorgan, Carmarthen, and Pembroke.

- AA. { 1. D. Best, Esq., Temple Laugherne.
 { 2. F. P. Norbury, Esq., Malvern.
 BB. { 1. R. M. Whiting, Esq., Hereford.
 { 2. No award.

Class 46.—Open only to Growers in the other Counties of Wales.

- AA. { 1. P. Yorke, Esq., Wrexham (gr. G. Aitkens).
 { 2. No award.
 BB. { 1. P. Yorke, Esq.
 { 2. No award.

Class 47.—Open only to Growers in the Six Northern Counties of England, and in the Isle of Man.

- AA. { 1. J. Brennard, Esq., Baldersby, Thirsk.
 { 2. No award.
 BB. { 1. J. Brennard, Esq.
 { 2. No award.

Class 48.—Open only to Growers in Scotland.

- AA. { 1. Col. Gordon, Castle Douglas (gr. J. Duff).
 { 2. The Earl of Galloway, Garlieston (gr. J. Day).
 BB. { 1. The Earl of Galloway.
 { 2. No award.

Class 49.—Open only to Growers in Ireland.

- AA. { 1. Mr. Blackmore, Garnaragh, Piltown.
2. C. B. Broad, Esq., Aghern Conna, Co. Cork.
BB. No entry.

Class 50.—Open only to Growers in the Channel Islands.
No entry.

DIVISION VI.

Single Dishes of Fruit grown in the Open Air.

Six Fruits to a Dish.

Open to Gardeners and Amateurs only. Nurserymen
and Market Growers excluded.

Prizes in each Class except 75, 91, 92, 98, 99, 110, 142,
1st Prize, 7s.; 2nd Prize, 5s.

CHOICE DESSERT APPLES.

N.B.—Quality, Colour, and Finish are of more merit than Size.

Class 51.—Adams' Pearmain.

1. Lord Hillingdon, Uxbridge (gr. A. R. Allan).
2. B. H. Hill, Esq.

Class 52.—Allington Pippin.

1. R. M. Whiting, Esq.
2. W. Barnes, Esq.

Class 53.—American Mother.

1. F. J. B. Wingfield-Digby, Esq.
2. C. H. Combe, Esq., Cobham (gr. A. Tidy).

Class 54.—Ben's Red.

1. H. J. King, Eastwell Park, Kent (gr. J. G. Weston).
2. J. B. Fortescue, Maidenhead (gr. C. Page).

Class 55.—Blenheim Orange.

1. Earl Nelson, Downton (gr. T. Beesley).
2. C. O. Walter, Esq., Wantage.

Class 56.—Charles Ross.

1. F. Paget Norbury, Esq., The Norrest, near Malvern.
2. W. E. S. E. Drax, Esq.

Class 57.—Christmas Pearmain.

1. B. H. Hill, Esq.
2. Col. Archer Houlton, Newbury (gr. C. Ross).

Class 58.—Claygate Pearmain.

1. W. Barnes, Esq., Bear Wood, Wokingham.
2. The Earl of Devon, Powderham (gr. T. H. Bolton).

Class 59.—Cox's Orange Pippin.

1. Lord Hillingdon.
2. Mrs. Knox, Alton (gr. W. West).

Class 60.—Egremont Russet.

1. F. J. B. Wingfield-Digby, Esq.
2. J. Speer, Esq., Swanley.

Class 61.—Fearn's Pippin.

1. W. Barnes, Esq.
2. B. H. Hill, Esq.

Class 62.—Golden Reinette.

1. Col. Biddulph, Ham (gr. E. Montague).
2. No award.

Class 63.—Houblon.

1. W. Barnes, Esq.
2. Col. Archer Houblon (gr. C. Ross).

Class 64.—James Grieve.

1. J. T. Atkinson, Esq., Caversham.
2. C. Gurney, Esq., Henlow Grange, Biggleswade (gr. A. Carlisle).

Class 65.—King of the Pippins.

1. Lord Hillingdon.
2. F. J. B. Wingfield-Digby, Esq.

Class 66.—King of Tomkins County.

1. C. H. Combe, Esq.
2. H. J. King, Esq.

Class 67.—Lord Hindlip.

1. Rev. S. Baring-Gould, Lew Down (gr. H. Hockin).
2. Rev. H. Bull.

Class 68.—Margil.

1. B. H. Hill, Esq.
2. C. Gurney, Esq.

Class 69.—Ribston Pippin.

1. Lord Howard de Walden.
2. Sir W. L. Greenwell, Bart.

Class 70.—Rival.

1. R. M. Whiting, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 71.—Roundway Magnum Bonum.

1. Earl Stanhope, Chevening, Sevenoaks (gr. J. C. Sutton).
2. J. B. Fortescue, Esq.

Class 72.—Scarlet Nonpareil.

1. B. H. Hill, Esq.
2. R. M. Whiting, Esq.

Class 73.—St. Edmund's Pippin.

1. W. Barnes, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 74.—Wealthy.

1. H. J. King, Esq.
2. B. H. Hill, Esq.

Class 75.—Any other variety not included above.

Four Prizes : 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 75, in which Class eight fruits must be shown to a dish, for the Judges to be able to taste two of them ; the name of the variety must be given on the Entry Form.

1. Lord Hillingdon.
2. C. H. Combe, Esq.
3. Dowager Lady Hillingdon.
4. W. H. Myers, Esq., Bishops Waltham (gr. 4. Ellwood).

CHOICE COOKING APPLES.

N.B.—Quality and Size are of more merit than Colour.

Class 76.—Alfriston.

1. F. J. B. Wingfield-Digby, Esq.
2. John Lee, Esq.

Class 77.—Annie Elizabeth.

1. Earl Nelson.
2. W. Barnes, Esq.

Class 78.—Beauty of Kent.

1. B. H. Hill, Esq.
2. E. W. Caddick, Esq., Caradoc, Ross.

Class 79.—Bismarck.

1. { W. Barnes, Esq.
(Extra Prize) Capt. Farwell.
3. Denis Best, Esq.

Class 80.—Bramley's Seedling.

1. W. Barnes, Esq.
2. Col. Archer Houblon (gr. C. Ross).

Class 81.—Dumelow's Seedling (*syn.* Wellington, Normanton Wonder).

1. J. B. Fortescue, Esq.
2. J. Speer, Esq.

Class 82.—Ecklinville.

1. Earl Nelson.
2. Rev. H. Bull.

Class 83.—Edward VII.

1. R. M. Whiting, Esq.
2. No award.

Class 84.—Emneth Early (*syn.* Early Victoria).

No entry.

Class 85.—Emperor Alexander.

1. W. A. Voss, Esq., Raleigh.
2. W. E. S. E. Drax, Esq.

Class 86.—Gascoyne's Scarlet.

1. W. E. S. E. Drax, Esq.
2. H. J. King, Esq.

Class 87.—Golden Noble.

1. F. J. B. Wingfield-Digby, Esq.
2. E. J. Wythes, Esq., Copped Hall (gr. A. Bullock).

Class 88.—Golden Spire.

1. John Lee, Esq.
2. W. E. S. E. Drax, Esq.

Class 89.—Grenadier.

1. J. B. Fortescue, Esq.
2. W. E. S. E. Drax, Esq.

Class 90.—Hambling's Seedling.

1. W. E. S. E. Drax, Esq.
2. Col. Archer Houblon, Bishop Stortford (gr. W. Harrison).

Class 91.—Hector Macdonald.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open to Exhibitors living in Cardigan, Radnor, Shropshire, Staffs, Warwick, Northampton, Bedford, Cambridge, Essex, or counties further north.

No entry.

Class 92.—Hector Macdonald.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living south of before-named counties.

1. Col. Archer Houblon (gr. C. Ross).
2. } No other entry.
3. }

Class 93.—Hormead Pearmain.

1. F. J. B. Wingfield-Digby, Esq.
2. R. M. Whiting, Esq.

Class 94.—Lady Henniker.

1. B. H. Hill, Esq.
2. The Earl of Devon.

Class 95.—Lane's Prince Albert.

1. F. J. B. Wingfield-Digby, Esq.
2. E. W. Caddick, Esq.

Class 96.—Lord Derby.

1. Denis Best, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 97.—Mère de Ménage.

1. B. H. Hill, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 98.—Newton Wonder.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living in Cardigan, Radnor, Shropshire, Stafford, Warwick, Northampton, Bedford, Cambridge, Essex, or counties further north.

1. C. Gurney, Esq.
2. Col. Archer Houblon (gr. W. Harrison).
3. Marquess of Northampton.

Class 99.—Newton Wonder.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Only open to Exhibitors living south of before-named counties.

1. W. Barnes, Esq.
2. F. J. B. Wingfield-Digby, Esq.
3. W. E. S. E. Drax, Esq.

Class 100.—Norfolk Beauty.

1. B. H. Hill, Esq.
2. No award.

Class 101.—Peasgood's Nonesuch.

1. C. Gurney, Esq.
2. W. E. S. E. Drax, Esq.

Class 102.—Potts' Seedling.

1. F. W. Platt, Esq., Highgate (gr. C. Turner).
2. E. W. Caddick, Esq.

Class 103.—Royal Jubilee.

1. B. H. Hill, Esq.
2. J. B. Fortescue, Esq.

Class 104.—Royal Late Cooking.

No entry.

Class 105.—Sandringham.

1. W. Barnes, Esq.
2. R. M. Whiting, Esq.

Class 106.—Stirling Castle.

1. E. W. Caddick, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 107.—The Queen.

1. Lord Howard de Walden.
2. W. Barnes, Esq.

Class 108.—Tower of Glamis.

1. H. J. King, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 109.—Warner's King.

1. Denis Best, Esq.
2. B. H. Hill, Esq.

Class 110.—Any other variety not included above.

Four Prizes: 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 110, in which Class eight fruits must be shown to a dish, for the Judges to be able to taste two of them; the name of the variety must be given on the Entry Form.

1. Col. Archer Houblon (gr. C. Ross).
2. J. T. Charlesworth, Esq., Nutfield (gr. T. W. Herbert).
3. W. Barnes, Esq.
4. F. J. B. Wingfield-Digby, Esq.

CHOICE DESSERT PEARS.

Class 111.—Beurré Alexander Lucas.

1. F. J. B. Wingfield-Digby, Esq.
2. R. M. Whiting, Esq.

Class 112.—Beurré d'Amanlis.

No award.

Class 113.—Beurré d'Anjou.

No award.

Class 114.—Beurré d'Avalon (*syn.* Porch's Beurré and Glastonbury).

No entry.

Class 115.—Beurré Bosc.

1. Sir C. Hamilton, Bart.
2. Capt. Farwell.

Class 116.—Beurré Dumont.

1. Dowager Lady Hillingdon.
2. Lord Hillingdon.

Class 117.—Beurré Hardy.

1. Col. Archer Houblon (gr. W. Harrison).
2. Rev. H. Bull.

Class 118.—Beurré Superfin.

1. Dowager Lady Hillingdon.
2. Mrs. Ford, Ravenscourt Park (gr. F. Blackith).

Class 119.—Charles Ernest.

1. F. J. B. Wingfield-Digby, Esq.
2. R. M. Whiting, Esq.

Class 120.—Comte de Lamy.

1. Dowager Lady Hillingdon.
2. J. T. Charlesworth, Esq.

Class 121. Conference.

1. Major Petre.
2. A. P. Brandt, Esq., Bletchingley Castle (gr. J. W. Barks).

Class 122.—Doyenné du Comice.

1. F. J. B. Wingfield-Digby, Esq.
2. Col. Archer Houblon (gr. W. Harrison).

Class 123.—Durondeau.

1. Major Petre.
2. F. J. B. Wingfield-Digby, Esq.

Class 124.—Emile d'Heyst.

1. Mrs. Ford.
2. Col. Hon. Chas. Harbord.

Class 125.—Fondante d'Automne.

No award.

Class 126.—Fondante de Thiriot.

No award.

Class 127.—Glou Morceau.

1. Major Petre.
2. Capt. Farwell.

Class 128.—Joséphine de Malines.

1. F. J. B. Wingfield-Digby, Esq.
2. F. R. Rodd, Esq.

Class 129.—Le Lectier.

1. Lord Howard de Walden.
2. Lord Foley.

Class 130.—Louise Bonne of Jersey.

1. W. E. S. E. Drax, Esq.
2. Rev. H. Bull.

Class 131.—Marguerite Marillat.

No entry.

Class 132.—Marie Benoist.

1. B. H. Hill, Esq.
2. Rev. H. Bull.

Class 133.—Marie Louise.

1. Col. Hon. Chas. Harbord.
2. F. E. Croft, Esq., Stanstead Abbots (gr. G. Longhurst).

Class 134.—Nouvelle Fulvie.

1. F. J. B. Wingfield-Digby, Esq.
2. Col. Hon. Chas. Harbord.

Class 135.—Pitmaston Duchess.

1. Major Petre.
2. Rev. H. Bull.

Class 136.—President Barabé.

1. Col. Hon. Chas. Harbord.
2. Lord Hillingdon.

Class 137.—St. Luke.

1. J. B. Fortescue, Esq.
2. No award.

Class 138.—Souvenir du Congrès.

No award.

Class 139.—Thompson.

1. F. J. B. Wingfield-Digby, Esq.
2. Rev. H. Bull.

Class 140.—Triomphe de Vienne.

1. No award.
2. Capt. Farwell.

Class 141.—Winter Nelis.

1. B. H. Hill, Esq.
2. J. B. Fortescue, Esq.

Class 142.—Any other variety not included above.

Four Prizes : 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 142, in which Class eight fruits must be shown to a dish, for the Judges to be able to taste two of them; the name of the variety must be given on the Entry Form.

1. Rev. H. Bull.
2. M. P. Mead, Esq., Teddington.
3. H. Andrews, Esq.
4. W. A. Voss, Esq.

GENERAL MEETING.

OCTOBER 27, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair.

Fellows elected (25).—Lady Bellew, A. Brock, Colonel E. T. Browell, Mrs. Burmeister, C. G. Busby, J.P., A. O. Cooke, Miss P. Cotton, H. Craven, Mrs. W. de Falbe, C. E. Eastick, F.C.S., Mrs. H. S. Foster, Mrs. Tresham Gilbey, Mrs. Berkeley Hallé, E. Percy Harvey, H. B. Herbert, P. Hill, A. G. Lloyd-Barrow, Mrs. A. H. Malcolm, Miss S. Medhurst, Mrs. F. K. Metcalfe, Mrs. Arundell Mildmay, John Nayler, Mrs. Oliverson, F. M. Spencer, Mrs. A. Weismann.

Fellows resident abroad (2).—J. Venkata Krishnaya (India), P. R. Mudaliar, B.A. (India).

A lecture was given on "The Modification of Leaves and Stipules for Special Purposes," by the Rev. Professor G. Henslow, M.A., F.L.S., V.M.H. (see p. 411).

GENERAL MEETING.

NOVEMBER 10, 1908.

Mr. E. H. JENKINS, F.R.H.S., in the Chair.

Fellows elected (25).—Colonel J. A. Annand, J. E. Chapman, Mrs. Warner Circuit, Mrs. Gordon W. Clark, A. W. Dance, Dr. Davidson, Miss

EXHIBITION OF COLONIAL-GROWN FRUIT AND VEGETABLES. ccvii

C. Henderson, Mrs. Heyworth, Mrs. C. G. Hoare, H. G. Hurn, Mrs. E. Kelly, Mrs. W. Leech, Mrs. Payne, W. Poupert, Junr., Mrs. Rathbone, Mrs. Albert Robinson, C. Schlee, Mrs. E. Schwann, J. Slack, Mrs. George Smith, G. W. Thackrah, Hon. Mrs. Tryon, W. H. Turner, Mrs. Spencer Whitehead, W. Woods.

Fellows resident abroad (2).—E. Annan Brew (Gold Coast, Africa), E. Kinsey Thomas (U.S.A.).

A lecture was given on "British Wild Flowers in the Garden," by John W. Odell, F.R.H.S. (see p. 419).

GENERAL MEETING.

NOVEMBER 24, 1908.

Sir ALBERT ROLLIT, D.L., in the Chair.

Fellows elected (30).—Miss E. Aston, N. B. Aweock, J. B. Brodie, Mrs. Miles F. Burrows, Miss A. A. Cameron, Mrs. Carr-Gomm, Mrs. Charles Cave, F. Chambers, Miss K. Cholmondley, Admiral Sir Bouverie F. Clark, K.C.B., Miss E. Craig, Mrs. Crocker, Sir James Drummond, Bart., J. Elden, Miss S. M. Forbes, G. E. Gordon, B.A., Miss C. Hassard, Mrs. Arthur Henty, Arthur W. Hill, M.A., F.L.S., C. Hobbs, Albert E. Hay, T. R. Hyam, B.A., Mrs. Kellgren, Mrs. McCreery, John Mann, J.P., Mrs. Palmer, Mrs. Alfred Pinckney, Mrs. Hans Sauer, Martin Silsbury, F. W. Wignall.

Fellow resident abroad (1).—Mrs. Linton (Tasmania).

Society affiliated (1).—Cumnor Horticultural Society.

A lecture was given on "Italian Gardens," by Mr. Joseph Cheal, F.R.H.S. (see p. 446).

EXHIBITION OF COLONIAL-GROWN FRUITS, VEGETABLES, AND PRESERVES, AND OF HOME BOTTLED AND PRE- SERVED BRITISH FRUITS AND VEGETABLES.

NOVEMBER 26 TO 30, 1908.

IF previous Shows of Colonial-Grown Fruits have been disappointing, this was a great success. The Hall was filled to its utmost capacity with magnificent fruit, more particularly from Canada, British Columbia, and the West Indies. The large consignments sent from these Colonies showed their appreciation of the Society's efforts in the organization of these exhibitions, and of their practical value; Ontario was in evidence for the first time, and it is hoped that next year Quebec will also be represented.

A Show of Home-Bottled Fruits was held on the same date, and it was very gratifying to notice the substantial increase in the number of entries, which this year amounted to seventy-nine as against thirty-two in 1907.

In the unavoidable absence of the President of the Society, Lord Strathcona and Mount Royal, G.C.M.G., who had kindly consented to

perform the opening ceremony, was received by Lord Balfour of Burleigh, K.T., supported by Sir Albert Rollit, D.L., and other members of the Council, together with Sir Henry Davson, Kt., Deputy Chairman of the West India Committee, Sir Daniel Morris, K.C.M.G., late Imperial Commissioner West Indies Agricultural Department, the Hon. Forster M. Alleyne of Barbados, the Hon. J. H. Turner, Agent-General for British Columbia, J. Howard, Esq., Agent-General for Nova Scotia, and W. Liney Griffith, Esq., Secretary to the High Commissioner for Canada.

LORD BALFOUR, in asking Lord Strathcona to declare the Show open, said: Lord Strathcona, Ladies and Gentlemen, I am here as a substitute for the President of the Royal Horticultural Society, Sir Trevor Lawrence. He intended to be here, but is kept away by a rather serious sore throat, else he would certainly have fulfilled his engagement; because, in common with all the other members of the Council of our Society, he takes a very warm and genuine interest in the series of enterprises in pursuance of which we are met here to-day. This, ladies and gentlemen, is the twelfth Show of Colonial fruit which our Society has held under its own auspices and organized by itself. The first was held so long ago as 1904, and this, as I have said, is the twelfth in succession. We have large entries from British Columbia, from Ontario, from Nova Scotia, from the West Indies including for the first time the Leeward Islands, from New Zealand, from New South Wales, and from Western Australia. It promises to be the largest of all the Colonial Shows which have been held by the Society. Our greatest sister nation, the Dominion, is largely represented here, but we are not exclusively Canadian in our interests; we are, and aim to be, really Imperial in the best sense of the term. I am sure we could not have secured the presence among us to-day of one who more nobly represents the Imperial idea than our guest, Lord Strathcona and Mount Royal, who is to open the Show. He is, in truth, one of the grand old men of the Empire; and it is no little source of pride to me to think that in a humble way I am his fellow-countryman from Scotland. But if we are proud of him in Scotland, they are proud of him in Canada as well. Now, as I have said, the object of these Shows is Imperial in the true sense of the term. We wish to stimulate the production of the best fruit; we wish to afford information to the growers as to the best means of placing it on the market; and we wish to inform home consumers where they can get the best article that our fellow-subjects all over the world can produce. So far I venture to say that the results have been encouraging. Every year sees a general advance on its predecessor—in quality, in packing, in suitability for the market; and many letters have been received from our friends across the seas, in acknowledgment of the efforts we are making on their behalf. Now I come to a word for the Society itself. In this matter the Society, as a society, has little to gain except credit. We not only make no money out of it, but, if you will believe me, we do not aim at so doing. We are fully aware that we *must* make a loss. But I venture to say we do that cheerfully; we do it because we think it our duty; we do it because we are kindly supported by friends at home. And may I say that if we show our good will towards the interest of our friends across the sea, it remains for those friends, or their friends' friends at home, to do what they can to show their appreciation of our efforts, to

come here and to give us encouragement; and I do not believe that the presence of anyone would secure that more effectually than the presence of our guest, Lord Strathcona, who is to open the Show to-day.

LORD STRATHCONA said: Lord Balfour, Ladies and Gentlemen, I assure you I regard it as a privilege and an honour to be asked to be present with you now, to assist in opening this exhibition. I have had the advantage of looking round it; and I am sure that all of you, when you look at the products from the different parts of the Empire, will say that we have within ourselves, in outlying parts of the Empire and in the United Kingdom, without going to foreign countries, everything that is required by way of either comfort or luxury.

One of the names of the countries sending produce here takes my mind back for many years—eighty years ago, when I well recollect that I gained a considerable knowledge about the West Indies. At that time Africa was the dark continent. There were then only two outlets for the young men of the United Kingdom—India and the West Indies. And among others who went to the West Indies there was, fortunately for us, who were children at the time, one of my mother's relatives, who used to send us home those nice fruits such as tamarinds, which at that time were to be had only from the West Indies; so that my acquaintance with the West Indies goes very far back indeed. There was then no possibility as now of sending such delicious fresh fruits from those distant islands. Now, with cold storage, you may have anything and everything you like, in good condition, from every part of the Empire; and as proof of that we have an object-lesson here to-day in apples and pears from British Columbia, the farthest part of the Dominion, and fruit from the West Indies, and to a smaller extent also from Australia and New Zealand. It was only the other day, only some thirty years ago, that, in England, British Columbia was spoken of as a sea of mountains, the notion being that it was fit for nothing but to look at, as you would look at the Alps or the Apennines. And that opinion was held not only by those who were ignorant of the ordinary affairs of life but even by statesmen of the day. We see here from British Columbia various kinds of apples, including some not bright and ruddy-cheeked, but golden apples (Grime's Golden), which I am told are perhaps the most delicious of all. However, I would make an exception to that. There is no exhibit here from the province of Quebec; there is from Ontario; and there is also a very excellent exhibit from the Annapolis Valley and from Nova Scotia generally. But the province of Quebec might also have sent to you the old 'Fameuse' apple of Canada, than which, without saying a word against the delicious apples here, I think there can be nothing more exquisite.

That this Society has done a great work you have heard already from Lord Balfour of Burleigh. He has told you so fully of its initiation and of the excellent service it has done to the mother country and to the Empire generally, that it is really unnecessary for me to say a word further than this. We Colonials ought to feel that we are under a very great obligation to the Royal Horticultural Society for all they are doing, not for the purpose of gain to themselves, but in the spirit of true patriotism and in the sole interest of the Empire. To show the

great good this Society does we have here as an object-lesson an exhibit from the little Island of Cyprus. Cyprus exhibited for the first time in March last. The exhibit was creditable; but, owing to the effort of this Society in sending out reports and suggestions, the present exhibit from Cyprus is one of a markedly improved character. And as the Society has done in Cyprus, so it has done throughout the whole of the Colonies. The West India Committee has also done most excellent work. It has instituted in the different islands of that beautiful group Permanent Local Committees for the purpose of arranging for produce to be shown at these exhibitions, and of so proving to the mother country and to the rest of the world what can be done in those islands. And speaking of the West Indies, I may say that we in Canada most earnestly wish to be connected with them in the closest possible way—and as an evidence of that, the Dominion of Canada, which was foremost in giving preference to the mother country, has also extended a preference to the West Indies. As an example of the good that this has done I can point to hundreds of thousands, even millions, of pounds of sugar which formerly came to Canada through Germany, now comes from the West Indies. But I could multiply indefinitely the instances of the good that is being done by such exhibitions as the present; and I need only add that I am sure all Colonials desire that the Royal Horticultural Society may go on prospering and to prosper, and that they will give it every support they possibly can. It now only rests with me to declare this exhibition open.

SIR DANIEL MORRIS, K.C.M.G., said: Lord Balfour, Ladies and Gentlemen, I have been asked to move a very cordial vote of thanks to Lord Strathcona and Mount Royal for his kindness in coming here to-day and opening this exhibition. I have been for some time connected with the Royal Horticultural Society, and have been employed in different parts of the Empire in assisting to produce some of the exhibits that are to be seen here to-day. I therefore have all the greater pleasure in moving this vote of thanks to Lord Strathcona for his kindness in coming here, and for the very wise and courteous words that he has addressed to us. I have on several occasions visited Canada. I know the Annapolis Valley in Nova Scotia; I know the fruit-belt in Ontario, and I have now for the first time seen what splendid vegetables and fruits can be produced on the Pacific Coast of the Dominion of Canada. We ought to congratulate Canada, through Lord Strathcona, on the splendid exhibits sent for our inspection to-day; therefore I have great pleasure in proposing this vote of thanks.

LORD STRATHCONA: I thank you for your great kindness; and let me say that it gives me still greater pride to be supported here by Lord Balfour of Burleigh. I am proud of being his countryman. He has spoken of his satisfaction at being a countryman of mine; and I assure you that I, like all Scotsmen, am proud of Lord Balfour.

JUDGES OF COLONIAL FRUIT.

Bunyard, Geo., V.M.H.
Butt, George.
Fielder, C. R.
Hudson, Jas., V.M.H.

Monro, Geo., V.M.H.
Garcia, M.
Walker, A. M.

JUDGES OF COLONIAL PRESERVES, &c.

Bowles, E. A., M.A., F.L.S. | North, Emile.

JUDGES OF HOME-BOTTLED FRUITS.

Senn, C. Herman. | Wilks, Rev. W., M.A.

Colonial Fruits.

Gold Medal.

The Government of the Province of British Columbia (Agent-General : Hon. J. H. Turner, Salisbury House, E.C.), for Apples.

The Government of Nova Scotia (Agent-General : Hon. John Howard, 57 Pall Mall, S.W.), for a collection of Fruit.

The Government of Ontario (Agricultural Department : Mr. P. W. Hodgetts, Toronto), for a collection of Fruit, Vegetables, and Preserves.

Silver-Gilt Hogg Medal.

Mr. F. A. Parker, Berwick, Nova Scotia, for Apples.

Silver-gilt Knightian Medal.

Kamloops District, British Columbia, for Apples.

Kaslo District Horticultural Association, British Columbia, for Apples.

Mr. Thos. G. Earl, Lytton, British Columbia, for Apples.

Mr. W. H. Woodworth, Berwick, Nova Scotia, for Apples.

Mr. H. A. Blanchard, Upper Dyke, Nova Scotia, for Apples.

Imperial Department of Agriculture, Dominica (Botanic Section), for a collection of Fruit.

Hon. Dr. H. A. A. Nicholls, C.M.G., Dominica, for Limes, &c.

Silver-gilt Banksian Medal.

West Indian Produce Association for collection of Fruits, &c.

Silver Hogg Medal.

Mr. J. H. Cox, Cambridge, Nova Scotia, for Apples.

Silver Knightian Medal.

Summerland District, British Columbia, for Apples.

Mrs. J. A. Smith, Spences Bridge, British Columbia, for Apples.

Mr. H. Dalmain, Wolfville, Nova Scotia, for Apples.

Mr. E. E. Archibald, Wolfville, Nova Scotia, for Apples.

Mr. R. J. Messenger, Tupperville, Nova Scotia, for Apples.

Mr. J. A. Kinsman, Lakeville, Nova Scotia, for Apples.

Mr. F. H. Johnson, Bridgetown, Nova Scotia, for Apples.

Hon. J. Cox Fillan, Wall House, Dominica, for Limes.

Mr. A. R. C. Lockhart, Castle Comfort, Dominica, for Limes.

The Jamaica Agency, Holborn, for Oranges and Grape Fruit.

Messrs. B. Shearn, Tottenham Court Road, for Nuts.

Silver Banksian Medal.

Salmon Arms Farmers Exchange, British Columbia, for Apples.

Mr. A. L. Morse, Berwick, Nova Scotia, for Apples.

Mr. E. T. Neilly, Middleton, Nova Scotia, for Apples.
Mr. F. Foster, Kingston, Nova Scotia, for Apples.
The Agricultural School, Dominica, for Oranges.
Messrs. Elders and Fyffes, Jamaica, for Oranges.
New Zealand Government, for Apples preserved by cold storage.
The Permanent Exhibition Committee of Trinidad, for Citrus Fruits.

Bronze Banksian Medal.

Victoria District, British Columbia, for Apples.
Salt Spring Island, British Columbia, for Apples.
Mr. James Johnstone, Nelson, British Columbia, for Apples.
Mr. James Gartrell, Summerland, British Columbia, for Apples.
The Chilliwack District, British Columbia, for Apples.
Mrs. W. Sangster, Falmouth, Nova Scotia, for Apples.
Mr. Ralph Eaton, Kentville, Nova Scotia, for Apples.
The Berwick Fruit Co., Berwick, Nova Scotia, for Apples.

Colonial Preserves.

Silver Knightian Medal.

West Indian Produce Association, Fenchurch Buildings, E.C., for Preserves.

Norbrook Preserving Co., Jamaica, for Preserves.
Messrs. R. Jackson, Piccadilly, W., for Cape Jams and Canned Fruits.

Silver Banksian Medal.

Messrs. S. Kirkpatrick, Nelson, N.Z., for Preserves.
The Dominica Agency, Lime Street, E.C., for Lime Marmalade, &c.
The Government of New South Wales, for Preserves.
Mr. W. J. Ansell, I.S.O., Cyprus, for Bottled Fruits.

Bronze Banksian Medal.

Messrs. Clarke, Whangarei, New Zealand, for Preserves.
Hokianger Co-operative Preserving Co., Raverne, New Zealand, for Preserves.

The Government of New Zealand, for Honey.
Montserrat Preserving Co., for Colonial Preserves.

Home Bottled and Preserved Fruits.

Class 25.—Home Bottled British-grown Fruits. *Open.* This exhibit must not occupy a space greater than 10 feet by 8 feet. All must be British-grown and British-prepared.

1. *Silver-gilt Knightian Medal.*

Lady Algernon Gordon-Lennox, Broughton Castle.

2. *Silver-gilt Knightian Medal.*

Mr. W. Poupart, Junr., Twickenham.

3. *Bronze Knightian Medal.*

Miss Edith Bradley, Greenway Court, Hollingbourne.

Class 26.—24 bottles of British-grown Fruits (including eight different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade.

1. £4.—No First Prize awarded.
2. £3.—Miss Caroline Jones, Orpington.
3. £1.—Mrs. V. Banks, 102 Park Street, W.

Class 27.—18 bottles of British-grown Fruits (including six different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade.

1. £3.—No First Prize awarded.
2. £2.—Mrs. W. H. Plowman, 16A Chapter Street, Westminster.
3. 15s.—Mrs. Tilson Lee, Redhill.

Class 28.—12 bottles of British-grown Fruits (including four different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade.

1. £2.—Mr. Geo. H. Jolly, 111 Long Acre, W.C.
2. £1.—Mr. G. Hobday, Romford.

Class 29.—8 bottles of British-grown Fruits (of which one must be Raspberries), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade. To be shown November 26 1908, and left in the Society's care until a corresponding date in 1909 when they will be tested and the prizes awarded.

First Prize, Small Silver Cup ; Second, 80s.

Twenty-five entries, as follows :—

- Mrs. W. Parlour, Croft, Darlington.
- Mrs. Geo. H. Sims, Maidstone.
- Miss Caroline Jones, Orpington.
- Mrs. V. Banks, 102 Park Street, W.
- Mrs. E. J. Beckett, Aldenham Park.
- Mrs. W. H. Plowman, Westminster.
- Mrs. Tilson Lee, Redhill.
- Miss M. Yeatts, Frinton-on-Sea.
- Miss M. G. Thompson, Potters Bar.
- Mr. H. Tobutt, Wallington.
- Mr. Sidney J. Brown, Richmond.
- Mr. B. C. Dyson, Bramley, Leeds.
- Mr. Geo. H. Jolly, 111 Long Acre, W.C.
- Miss L. Sparrow, Shenley.
- Mr. F. J. Mumford, Kidderminster.
- The Misses Lomax, Buxted.
- Mr. G. Churcher, Alverstoke.
- Miss Lorna F. Bunyard, Idehill.
- Rev. J. B. Shackle, Dropmore Vicarage.
- Miss Gayton, Much Hadham. (Cook: M. J. Skipp.)
- Miss A. Brinklow, Stevenage.
- Mrs. H. E. Crosse, Terrington St. Clement.
- Mr. W. J. Grace, Grove Park.
- Mrs. Chas. Cave, Ditcham Park. (Cook: Mrs. Haseley.)
- Mr. Chas. Coates, Garstone, Kenley, Surrey.

Class 32.—Home-bottled Vegetables. *Amateurs*. Eight bottles, including four different kinds at least.

1. £1. 10s.—Mrs. V. Banks, 102 Park Street, W.

2. 15s.—Mrs. W. Parlour, Croft, Darlington.

Class 34.—18 One Pound Clear Glass Jars or Bottles of Jam (Jellies excluded), made of British-grown fruits only (including six different kinds at least), made and shown by exhibitors who do not sell their produce or in any way work for the trade.

1. £8 { Mrs. V. Banks, 102 Park Street, W.
 { Miss M. G. Thompson, Potters Bar.

2. £2.—Mrs. E. J. Beckett, Aldenham Park.

Class 35.—12 One Pound Clear Glass Jars or Bottles of Fruit Jellies and Fruit Cheese (including six kinds at least), made and shown by exhibitors who do not sell their produce or in any way work for the trade.

1. £8.—Mrs. V. Banks, 102 Park Street, W.

2. £2.—Miss M. G. Thompson, Potters Bar.

Class 37.—Miscellaneous. (For Preserving Appliances, Bottles, &c.)

Silver Banksian Medal.

Miss Edith Bradley, Greenway Court, Hollingbourne, for Mercia Sterilizer.

Messrs. Fowler, Lee, Reading, for Sterilizers.

Messrs. Fowler, Lee, Reading, for Self-closing Fruit Bottle.

Mr. W. Poupart, Junr., Twickenham, for Cider and Honey.

Bronze Banksian Medal.

Mr. B. C. Dyson, Bramley, Leeds, for the "Perfection" Jar.

Class 37a.—Miscellaneous Collections.

Silver-gilt Knightian Medal.

Miss Martin, New York, for Fruits preserved in Brandy.

Silver Knightian Medal.

Mrs. Plowman, 18 Chapter Street, Westminster, for a Collection of Bottled Fruits and Jellies.

Messrs. Austin, Knipton, for Bottled and Canned Fruits.

Silver Banksian Medal.

Swanley Horticultural College, for Marmalade, Jellies, &c.

Mrs. A. A. Krieger, Sydenham, for Home-prepared Coffee extract.

GENERAL MEETING.

DECEMBER 8, 1908.

Sir ALBERT ROLLIT, D.L., in the Chair.

Fellows elected (44).—R. Shatto Adair, Mrs. C. Adeane, Rev. J. Lookington Bates, F. E. Beadle, Christopher Bourne, Miss Bovill, Mrs. Arthur S. Bowlby, C. T. Cooper, Mrs. R. W. Cooper, Miss D. de Zulusta,

Miss H. Druce, Mrs. Druce, Miss P. Duncombe, W. B. Dunlop, H. L. Florence, Miss Fulkes, A. Pearce Gould, F.R.C.S., J. Higgs, W. Hoggan, Miss Kekewich, Miss Krumbholz, Mrs. W. H. Maud, Miss Nicholson, W. P. Notcutt, J. S. Osbourne, H. G. Owles, Mrs. Pearson, R. W. Perkins, W. H. Pitt, T. F. Rider, G. P. Roddam, Miss Russell, Sir Benjamin Scott, Kt., H. J. Simmonds, Bovill W. Smith, Mrs. W. E. Stamer, Miss A. I. Tate, Alex. Thomson, Colonel M. F. Thrupp, W. G. Valentine, Mrs. W. Watson, J. G. Winckworth, J. T. Wood, Hon. Mrs. Percy Wyndham.

Fellows resident abroad (5).—A. C. Hartless (India), S. P. Lancaster (India), C. S. Longuet (New Zealand), C. F. Reading (Guernsey), S. F. Skedde (Canada).

A lecture on “Chrysanthemums” was given by Mr. D. B. Crane, F.R.H.S. (see p. 456).

GENERAL MEETING.

DECEMBER 22, 1908.

Sir TREVOR LAWRENCE, Bart., K.C.V.O., V.M.H. (President of the Society), in the Chair.

Fellows elected (62).—Mrs. Aitchison, Mrs. C. J. Barker, Lieut.-Colonel Sir David Barr, K.C.S.I., T. Blisset, B. Brown, H. W. Bryans, A. H. Catchpole, Miss Cawthorn, Talbot Clifton, C. J. Cunard, Mrs. Coster Edwards, Sir Maurice FitzGerald, Bart., Kt. of Kerry, C.V.O., Warneford Fletcher, Miss Fryer, Hon. Mrs. R. Greville, Mrs. G. de G. Griffith, Miss C. Hadden, Miss L. Holland, Rev. E. T. Hudson, Walter Irving, Mrs. Jesse, Mrs. E. Johnston, R. T. Jones, Mrs. A. Hamilton King, S. Lamb, Miss J. B. Langton, Major John H. Leslie, Lady MacGrigor, Colonel Harold Malet, A. Margetson, Captain E. T. Marshall, Mrs. Minchin, E. B. Mollett, Mrs. D. W. Moorhouse, R. Pearce, D. Peary, F. Gordon Penney, Mrs. Philip Pope, Miss E. Portal, Colonel A. Porter, M.D., J. F. Rayner, Mrs. W. T. Roberts, Miss M. Rücker, Lady Samuel, B. Eric Smith, H. Smith, R. Sowerbutts, R. Taylor, Mrs. J. Terry, Rev. G. Thompson, Miss Thomson, Mrs. J. M. R. Todd, Mrs. Beauchamp Tower, T. Tunbridge, Hon. Mrs. Walker, Hon. Mrs. Dudley Ward, C. H. Waterhouse, J. Watkins, C. B. Weir, Mrs. W. Withall, G. S. Woodcock, L. Hargreaves Wraith.

Fellows resident abroad (6).—C. Hamilton (Africa), Miss Taki Handa (Japan), H. L. Hutt (Canada), W. T. Macoun (Canada), H. Set (India), E. Blakeway (New Zealand).

Associates (8).—W. Evenden, E. T. Kirtland, Miss E. M. Willoughby.

SCIENTIFIC COMMITTEE.

SEPTEMBER 1, 1908.

Mr. C. T. DRUERY, F.L.S., V.M.H., in the Chair, and seven members present.

Mildew on Oak leaves.—Mr. Güssow reported that the fungus on certain oak leaves sent for inspection is probably a form of an *Uncinula*; it is in its conidial stage *Oidium* sp.

Gall on Wild Rose.—Mr. Douglas, V.M.H., showed specimens of the gall on the rose caused by the two-winged fly, *Cecidomyia rosarum*.

Streptocarpus.—Mr. Odell showed a light-coloured variety of *Streptocarpus* having a regular peloric corolla with six segments, the whole flower being campanulate; and a dark-flowered variety having the peduncle branched and the bracts foliaceous instead of very small, as is normal.

Abnormal flowering of Laburnum.—Mr. Gordon, V.M.H., mentioned that at the present time a Laburnum was flowering freely in his garden at Kew. The tree had occupied its present position some fifteen or sixteen years, and owing to it now taking up too much space all the branches were cut back to within three or four inches of the main stem after it had flowered last spring. The tree produced new shoots from the stumps of the branches, and of these about two-thirds produced terminal racemes of flowers, which were of a much larger size than the racemes previously produced in the usual way.

Eggs of Lace-wing Fly.—Mr. Druery, V.M.H., showed a 'Victoria' Plum upon which was a group of insect eggs on stalks, which had at first sight an appearance of a fungus, but it was determined to be the stalked eggs of the lace-wing fly.

Tomato with enlarged Calyx.—Mr. Wilson, Alveston, Chobham, Surrey, sent a Tomato with an extraordinarily large calyx, the segments measuring about 8 in. in length. It is not uncommon for the calyx to grow to this extent, particularly if the tomato plants are allowed to bear but few fruits on one branch.

Diseased Apples.—Mr. Howlett, 36 Bracondale, Norwich, submitted some Green Beaufin apples which were diseased. Mr. Güssow undertook to investigate the matter.

Yew blight.—A few diseased sprigs of Yew were submitted from Mrs. Lyell, of Ruckmans, Oakwood Hill, Surrey; the matter was left with Mr. Güssow to report.

Daffodil poisoning.—Dr. Plowright sent the following interesting note: "One often hears of cases in which the handling of Daffodil flowers by the gatherers has caused poisoning, but how many are really due to the flowers themselves and how many to incipient eczema or other skin disease on the part of the gatherer is not so clear. Cases in which the bulbs themselves are partaken of as food are not nearly so frequent. The

following note may, therefore, be of interest. A gentleman in King's Lynn purchased in the month of December 1907 a number of bulbs. These were, for security, placed in a paper bag upon a shelf in the kitchen. By some mischance the daffodil bulbs became mixed with the household stock of onions, and eventually were sliced up together with them and used in the preparation of soup, which was partaken of by the whole family. Shortly after the meal all the members were sick, they vomited freely, and suffered more or less from nausea, but they had neither abdominal pain nor diarrhoea. Recovery took place in from six to eight hours. The actual number of Daffodil bulbs used could not be ascertained. The remainder of the soup was used on the following day with the same result. This led to the investigation of the onion stock. That the illness was not due to ptomaine poisoning is shown by the complete recovery in eight hours, and by the absence of pain and diarrhoea."

Alien plants, &c.—Mr. Fraser, F.L.S., showed a specimen of *Erysimum altissimum* L., a plant previously recorded as occurring spontaneously in Britain in the "Journal of Bot.," vol. x., under the name of *Erysimum pannonicum*, and in the "Flora of Surrey" (1868) as being found as an introduced plant at Battersea Fields. Mr. Fraser had himself found it at East Ham in 1906, at Greycoat Place, Westminster, 1907, and on Putney Common, and on the new Kingsway and Aldwych sites this year. The specimen he showed had its petals reduced to the claw, as if resorting to self-fertilization. In addition to this plant he had found upon the Kingsway and Aldwych sites the following British plants: *Epilobium angustifolium*, *E. hirsutum*, *Senecio viscosus*, *Pyrus Malus*, *Brassica Rapa*, *Cnicus arvensis*, *C. lanceolatus*, *Sonchus arvensis*, *Pteris aquilina*, and *Centaurea Cyanus*; and the following aliens: *Salvia verticillata*, *Erigeron canadensis*, *Fragaria chiloensis*, *Eschscholzia californica*, *Cucurbita Pepo*, *Helianthus annuus*, *Oenothera biennis*, and *Papaver somniferum*.

SCIENTIFIC COMMITTEE, SEPTEMBER 15, 1908.

Dr. M. C. COOKE, M.A., V.M.H., in the Chair, and eight members present.

Mushrooms from spores.—Dr. Cooke, V.M.H., read a communication concerning a Mushroom, *Agaricus elvensis*, which had occurred in two gardens after pieces of this species had been thrown out, and which had evidently grown from the spores so distributed. They had, after their first appearance, grown in the same spot year after year. (See p. 219.)

Diseased plants.—Mr. Güssow reported that he had examined the Apples referred to him at the last meeting; and had found nothing upon them except punctures made by some insect. He had also examined the Yew shoots, and was of opinion that they had been injured either by something having been poured over them or by fumes.

Sports in Papaver Rhoëas.—Mr. W. G. Smith, Dunstable, wrote in reference to the Shirley Poppies with bracts at the base of the flowers and otherwise varying from the normal, saying that he had noticed similar

forms at Dunstable in *Papaver Rhoeas*, and he found that these came true from seed, at any rate for several years. He had also noticed forms with several flowers growing from just below the flower in its normal position, reminding one of the 'hen and chicken' Daisy, in which inflorescences behave in a similar manner. (See p. cxix.)

Ustilago hypodytes.—Dr. Plowright sent a specimen of *Ammophila arundinacea* "affected by the so-called *Ustilago hypodytes*. The affected plant has been growing in my garden for the last fifteen years, annually producing the fungus. The spores are produced inside the leaf sheaths, so that the latter look as though they had been filled with snuff packed in between the stem and the leaf. This year, however, the stems are contorted, and the growth very much distorted. The plant came originally from Wells-next-the-Sea, Norfolk."

Aster Tripolium.—Mr. Fraser, F.L.S., drew attention to the strongly entomophilous character of the Sea Aster (*Aster Tripolium*), and especially to the great variation in the number of ray florets found in the flower; many plants had the outer florets with broad rays, in some they were narrow, though numerous, in others they were very few, while quite frequently none at all were present. He found, however, that the various forms were all alike regularly visited by insects, especially the hive bee, the humble bee, and various flies (*Syrphideae*). The pollen was spiny in all, and there were numerous papillæ (from which an odour was exhaled?) upon the corolla and other parts of the flower.

Sisymbrium Sophia.—Mr. Fraser also showed specimens of *Sisymbrium Sophia*, in which, unlike the usual condition of things, the petals were less than half the length of the sepals.

Carrots splitting.—Several specimens of Carrots splitting lengthwise were exhibited, and Mr. Sutton, V.M.H., said that this almost invariably happened when the roots were left in the soil for a considerable time after they had reached maturity. Another cause of the splitting was the rapid absorption of water after a period of drought.

SCIENTIFIC COMMITTEE, SEPTEMBER 29, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., F.E.S., in the Chair, with sixteen members present and Mr. G. Paul, V.M.H., visitor.

The late Mr. George Nicholson, V.M.H..—The chairman referred in feeling terms to the great loss the Committee had sustained by the death of Mr. Geo. Nicholson, who had been for many years an active member of this Committee, and Mr. Bennett-Poë, V.M.H. moved, and Mr. Saunders, F.L.S., seconded, a resolution tendering the sincere condolences of the Committee to Mr. Nicholson's relatives. The resolution was carried in silence, the members upstanding in their places.

Sporting in Retinospora.—Mr. Paul, V.M.H., of Cheshunt, showed a specimen of *Retinospora squarrosa sulphurea* which was growing into the adult *Cupressus* form known as "*plumosa*," and which was still retaining the colour of "*sulphurea*." The adult form of this variety had not before appeared, though the variety *alba* had produced the *plumosa* type. *Retinospora* is the juvenile stage of *Cupressus*, and this being so it is

interesting to note that *R. leptoclada* has produced fruit and seeds which on germination gave rise to typical *leptoclada* plants. The form known as *obtusa compacta* has also produced fertile seeds, but the seedlings have not yet reached a size large enough to judge of their precise character.

Virescent Gaillardia.—Mr. Holmes, F.L.S., showed specimens of virescent *Gaillardia* flowers. These were taken by Mr. Saunders for further examination. Mr. Holmes also showed galls on the stem of Willow caused by the dipterous gall-fly, *Cecidomyia saliciperda*.

Proliferation in Pear.—Dr. Rendle, M.A., showed a Pear from the top of which several leaves were protruding. The fruit had been formed from a late flower, and such proliferation is not uncommon.



FIG. 109.—THE LATE MR. GEO. NICHOLSON, V.M.H. (*Gardeners' Chronicle*.)

Malformation in Streptocarpus.—Mr. Odell showed flowers of *Streptocarpus* in which there were petaloid outgrowths external to the corolla, these outgrowths being reversed, i.e., the part coloured like the inner part of the corolla being turned outwards.

Doubling in Cardamine pratensis.—Mr. Frazer, F.L.S., remarked upon the various forms of *Cardamine pratensis*, especially with regard to the doubling which results from axial proliferation, the calyx and corolla being repeated again and again, and the flowers being therefore infertile. He showed a specimen of the double-flowered form of the variety *palustris* of that plant.

Galanthus Olgae.—Mr. Bowles, F.L.S., showed flowers and foliage of this autumn-flowering Snowdrop, which has been described as having no green spots on the inner perianth segments, but in this specimen they

were well developed. The plants came from Mount Taygetas, and had commenced to flower at Waltham Cross early in September. The form differs from *G. octobrensis* in having a rather longer flower and commencing to flower at an earlier period. They are probably both forms of *G. nivalis*.

Vegetative growths on inflorescence.—Mr. Bowles also showed a well-developed vegetative growth from an inflorescence of *Kniphofia Northiae* seedling. There were three such growths upon the inflorescence, and while all the rest of the inflorescence appeared dead, there was a green strip of living tissue up the stem leading to the vegetative growths.

Fasciation in Oxalis crenata.—From Messrs. Barr came a remarkable example of fasciation in *Oxalis crenata*, the stem measuring over 4 inches across. This is the first time a fasciated specimen of any species of *Oxalis* has come before the Committee.

Multigeneric hybrids.—Mr. Bowles gave notice that at the next meeting the question of the nomenclature of multigeneric hybrids was to be raised.

SCIENTIFIC COMMITTEE, OCTOBER 18, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and fifteen members present.

The late Mr. G. Nicholson.—A letter was read by the Chairman from Lieut. Nicholson, thanking the Committee for the vote of condolence passed at the last meeting.

Snails and Water-Lilies.—Mr. Saunders, F.L.S., showed leaves of *Nymphæas* eaten by water snails. Mr. Hudson, V.M.H., said that he had found that an insecticide forced into the water so that it would rise just underneath the leaves had proved an effective remedy against the attacks of these pests.

Galls.—Mr. Odell showed plants of the common Nettle galled by the dipterous gall-fly, *Cecidomyia urticae*, from Stanmore Common, where the galls had been abundant this season. From Mr. Arnold came specimens of Beech leaves with the "nail galls" formed by the gall-fly *Hormomyia fagi*.

Curious growth of Potato.—Mr. Veitch, V.M.H., showed on behalf of Mr. Rumsey, of Leyton, a curious Potato which had been growing in the light but out of the soil for 18 months. It had, as usual under such conditions, produced a number of short, thick, purplish shoots, reaching in all to a length of about 2 inches to 2½ inches, and from these were developed a large number of closely appressed greenish roots.

Alien Weed.—Mr. Bowles showed specimens of *Galinsoga parviflora*, a weed which has been known for some time in gardens in Surrey and W. Middlesex, from a field near Enfield in Middlesex.

Precocious flowering.—Mr. Bunyard, V.M.H., sent a specimen of white Lilac just coming into flower, and Dr. Rendle mentioned that a Horse Chestnut tree was now in flower on Putney Heath.

Nomenclature of Orchid hybrids.—The following resolution was received from the Orchid Committee: "That the Scientific Committee be

asked to consider and advise upon the proper nomenclature of tri-generic, quadri-generic, and other hybrids, as it appears to the Orchid Committee that not more than two generic names can conveniently be combined in defining the origin of the hybrids." Several letters upon the subject were considered, and suggestions were made as to the best methods of forming names for these hybrids. It was finally proposed by Mr. Veitch, V.M.H., and seconded by Mr. Hurst, F.L.S., that a sub-committee should be formed to consist of five members of the Scientific Committee and five of the Orchid Committee, who should confer together and further consider the subject. This was carried, and Dr. Rendle, Messrs. Bowles, Fawcett, Hurst, and Rolfe were appointed to represent the Scientific Committee.

SCIENTIFIC COMMITTEE, OCTOBER 27, 1908.

MR. E. A. BOWLES, M.A., F.L.S., in the Chair, and thirteen members present.

Fasciation in Beans.—Mr. Worsdell, F.L.S., remarked that though the cause of this well-known phenomenon was so far unknown, in many cases it appeared possibly due to an excess of nourishment directed to a given spot, but it was also partly constitutional. He showed numerous specimens of Bean seedlings (*Phaseolus multiflorus*) in which he had, by removing the central shoot as soon as it made its appearance outside the seed, induced fasciation in the shoots which arose in the axils of the cotyledons. A majority of the plants treated had behaved in this way, but not all. In *P. vulgaris*, in which the cotyledons are raised above the surface, he had failed to induce fasciation, as the long hypocotyl apparently took all the surplus nourishment from the cotyledons. Fasciated roots appear to be rarely met with in nature, but he had been able to induce the formation of such in one case of *Phaseolus vulgaris*. After removing the radicle, an adventitious root had sprung from the hypocotyl, and this had become fasciated.

Mr. Chittenden, on behalf of a correspondent showed a fasciated stem of *Calystegia pubescens*.

Adventitious shoots on leaves of Cardamine pratensis.—Mr. Holmes, F.L.S., showed leaves of *Cardamine pratensis* fl. pl. bearing well-developed shoots arising from the tips and surface. The same phenomenon is frequent in the single form as well as in the double.

Viviparous grass.—Mr. Holmes also showed a specimen of *Aira caespitosa* with numerous small branches springing from the nodes. Such growths are very common in some grass species, and are often found in the inflorescence, particularly after a period of wet weather. They normally occur in that region in some species, as in *Festuca ovina* in moist mountainous districts.

Parasitic Rose canker.—Mr. Gussow showed specimens of this disease due to the attack of the fungus *Coniothyrium Fuckelii* (see p. 222).

Aerial tubers in Achimenes grandiflora.—Mr. Hales, F.R.H.S., showed specimens of this plant bearing numbers of greenish tubers in the leaf axils. These tubers easily fell away, and were produced by plants which had been grown on after they had finished flowering.

Crocus corms diseased.—Mr. Massee, V.M.H., showed corms of *Crocus* which had been killed by the bacterium *Pseudomonas hyacinthi*, which is the cause of the well-known disease of Hyacinths. He wished to draw attention to this disease, for which there is no cure, and to warn cultivators against planting diseased corms. When cut, the corms show the same yellow gummy exudation typical of the disease in Hyacinths.

New Certificate.—Mr. Bowles, M.A., announced that the Council had had under their consideration a new certificate which, it was suggested, should be designated a Certificate of Appreciation, to be awarded for worthy exhibits at the shows of objects demonstrating the results of experimental cultures in gardens with the aim of encouraging individual effort in this direction. The Council suggested that this Committee should undertake to consider such exhibits, a suggestion which the Committee cordially agreed to carry out.

Curious Narcissus bulb.—From the Rev. J. Jacob came a curious bulb of *Narcissus* in which the axis of a lateral offset had elongated and produced at its apex a small bulb quite normal in structure, about 2 inches above the other bulb.

Poppies with bracts, &c.—From a correspondent at Lincoln, who previously sent Shirley Poppies with numerous bracts just below the flowers, came further specimens. (See p. cxix.) In the accompanying communication he stated that these plants were undoubtedly hybrids, though unfortunately it was not known what the pollen parent had been, though the seed parent was the Shirley Poppy. Little seed was produced this year. From the same correspondent came specimens of Polyanthus having an enlarged calyx and no flower, and others with a rather less enlarged calyx and a small flower.

Apples showing "glassiness."—Two specimens of the Apple "Lane's Prince Albert" were sent, one from Harpenden, the other from Ross, both showing the peculiar greenish semi-transparency known as "glassiness." The appearance is due to the transfusion of the cell sap into the inter-cellular spaces, and it was suggested that this was due, perhaps, either to the very hot weather experienced during the beginning of October, or to the abundant rain following a period of drought. In the former case it was reported that every year from one tree some Apples showing the same appearance were gathered, and that the affected spots rotted after a time, and in the case from Ross 24 Apples showed the trouble, the remainder of those upon the tree being quite normal.

Certificate of Appreciation.

To Colonel R. H. Beddome, F.L.S., West Hill, Putney, for hybridizing Begonias, etc. (Granted by the Council.)

SCIENTIFIC COMMITTEE, NOVEMBER 10, 1908.

Mr. E. A. Bowles, M.A., F.L.S., F.E.S., in the Chair, and ten members present.

Grease bands.—Mr. Voss, F.C.S., showed a grease band from a Plum tree from a fruit garden at Enfield Highway. The grease band was about 6 inches wide, and upon it were a few specimens of the female winter moth, *Cheimatobia brumata*. The band had been on the tree a month, but not till now had any winter moth caterpillars been caught. The insects were near the bottom of the band. Mr. Voss promised to send up a band from the same garden to each meeting.

Fasciation in Mushroom.—Mr. Worsdell, F.L.S., showed a fasciated specimen of the common Mushroom, *Agaricus campestris*. Fasciation is apparently very uncommon in fungi.

Abnormality in Rubus.—Mr. Fraser, F.L.S., showed a specimen of *Rubus rhamnifolius*, with foliaceous sepals and adventitious roots at the base of the fruiting panicles, which are mostly flowerless. The internodes of the fruiting panicles (or what should have been such) are very little developed on the whole of last year's stems. Barren stems and leaves of this year are normal.

SCIENTIFIC COMMITTEE, NOVEMBER 24, 1908.

Mr. E. A. Bowles, M.A., F.L.S., in the Chair, and twelve members present.

Grease bands.—Mr. Voss, F.C.S., showed another grease band taken from the same tree as that shown a fortnight ago which had been placed upon the tree in succession to that. A considerable number of female winter moths had been captured near the base of the band, and a larger number of males. All, with one exception, belonged to *Cheimatobia brumata*, the exception being a male *Hibernia aurantiaria*.

Weevils in seeds.—Mr. Saunders, F.L.S., reported that the seeds of *Abrus precatorius* which were received from Mr. Bowles were attacked by a species of *Bruchus* allied to, though not identical with, *B. pisi*. The weevils were nearly as large as the seeds in which they occurred.

Silver-leaf in Plums.—Mr. Worsley showed a portion of the trunk of a Plum tree which had been attacked by "silver-leaf" disease, caused by the fungus *Stereum purpureum*. The discoloration of the wood appeared to start from the place where the bud had been inserted. Mr. Worsley also showed a seedling form of *Chrysanthemum indicum* and *Jatropha podagrica* attacked by *Botrytis cinerea*.

Marks upon Apple.—Mr. Saunders, F.L.S., showed a drawing of an Apple which had a curious looking brown mark stretching up one side of it about three-sixteenths of an inch in breadth. It was thought that this had probably been caused by the destruction of the epidermis as by a scratch at an early stage of the development of the fruit.

Stapelia gigantea.—Mr. Bennett-Poë, V.M.H., showed a flower of this species measuring about 11 inches in diameter.

Aberrations in Lonicera Periclymenum.—Mr. Fraser, F.L.S., showed flowers of the common Honeysuckle with green petals. It was remarked that this condition in Honeysuckle is very frequently associated with the presence of aphids upon the plant, especially near the inflorescence. Mr. Fraser also showed a specimen of the common Honeysuckle with leaves shaped somewhat like those of the Oak—this form he had found most frequently in plants growing in a shady wood. In *Lonicera japonica* the aberration is very common.

Variation in Polystichum angulare.—Mr. Druery, V.M.H., showed a “seedling” from the variety of *P. aculeatum* (or *angulare*?) called *pulcherrimum* (which was originally found growing wild), named *gracillimum*. The parent plant had remained sterile for a very long period, but at last two sporangia had been found upon it (without an indusium). The spores from these had been sown, and about 75 per cent. of the resulting plants had come precisely like the parent, and the remainder consisted of about 5 per cent. reversions to the normal type of the species, and 20 per cent. rather varying forms somewhat similar to the plant shown, where the frond was cut up into a number of narrow divisions. The variation had shown itself only after some time, the younger leaves being of the normal form.

Peloria in Cattleya labiata.—From Mr. Gurney Wilson, of Haywards Heath, came a very perfect specimen of a peloric *Cattleya labiata* in which the perianth was perfectly regular, as is not unusual, and in addition there were three properly developed stamens adnate to the column. Mr. Wilson also showed a dimerous specimen of *Cypripedium insigne*, which was not only a very perfect specimen of the rather common aberration, but was interesting on account of the fact that this is the second successive year in which the aberration has occurred in this plant.

Holly retaining berries.—Mr. Chittenden showed a branch of Holly from Wisley which was still carrying the berries produced in 1907. Adjacent trees had been stripped by the birds, but this and two other trees in the garden had retained their berries until now. During the past few days some had fallen, but otherwise the tree was as thickly berried as during the autumn of 1907.

An exotic worm from Wisley.—Mr. Chittenden showed an exotic worm, one of the Planarians, *Bipalium kewense* from the propagating pits at Wisley. The worms are of a dark greyish colour and measure up to about 15 inches in length. They are found living among the crocks at the bottom of the pots. They feed voraciously upon earthworms, and are, no doubt, capable, by reason of their shape and size, of pursuing them into their burrows. The animal is said to occur in hot-houses throughout the world.

SCIENTIFIC COMMITTEE, DECEMBER 8, 1908.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and eleven members present.

Eggs of earthworm.—Mr. Saunders, F.L.S., showed some of the egg capsules of the earthworm—small, roundish or ovoid sacs of a yellowish-white colour, each containing a few fertile eggs.

Grease bands.—Mr. Voss, F.C.S., again showed a grease band taken from the same tree as that shown at the last meeting. A few male and female specimens of *Cheimatobia brumata* had been captured during the past fortnight.

Proliferation in Pear.—Mr. Worsdell, F.L.S., showed a Pear having a second Pear developed from the apex just within the calyx.

Rhizophores of Selaginella.—Mr. Worsdell also showed specimens of *Selaginella inaequifolia* having rhizophores developed into leafy shoots. In this species the rhizophores are dark brown, and are borne normally at the fork of the stem, one on the upper and one on the under surface. In several instances in the specimens shown the rhizophores had become changed into leafy shoots, sometimes partially, sometimes entirely. Mr. Worsdell said this could be induced if the two branches of the forked stem are cut off just above their place of origin in their young state. In some plants of *S. Martensii* at Kew growing in a pan, those parts which were moist bore rhizophores in the normal manner, while in the upper part where the atmosphere was drier, instead of rhizophores, leafy shoots had developed.

Stamens of Orchids variable in number.—Mr. Fawcett showed drawings of the orchid *Epidendrum Ottonis* made from plants occurring wild in Jamaica. The flowers always there have three stamens while in Trinidad five stamens are developed in the same species, and in Venezuela the structure, according to Reichenbach, is normal.

Raisins.—Mr. Bennett-Poc, V.M.H., showed a portion of a bunch of excellent Raisins. Last year (1907) two bunches of Black Muscat "Mrs. Pince" had been placed in bottles in a dark cupboard. They had been forgotten, but were found in November of this year, when it was seen that each of the stems had sent out roots, which had died, owing to the subsequent drying up of the water. The Grapes had dried up and become converted into Raisins of excellent appearance and flavour.

Nerine hybrids.—Mr. Worsley showed inflorescences of two *Nerines* to illustrate the fact that *Nerine tardiflora* is a hybrid, having *N. flexuosa* var. *pulchella* as one of its parents. He also showed part of the scape of a *Marica*, on which numerous small plants had developed, and stated that plants raised from these buds took longer to arrive at a flowering stage than those of the same species raised from seed. In some species of *Marica*, however, there is no retardation of flowering following vegetative reproduction.

Interesting orchids.—Mr. Moore, V.M.H., of Glasnevin, sent two very interesting Orchids, *Arachnanthe Lowii* and *Angraecum caudatum*. In the former the first three or four flowers of the very long inflorescence are somewhat smaller and of a quite different colour from those of the

rest, from which they are separated by a considerable length of stem. No satisfactory suggestion as to the cause of this difference has been given. The flowers of *Angraecum caudatum* are remarkable for the extraordinary length of their spurs—quite 12 inches in one of the flowers, and nearly as much in the others on the same inflorescence.

Leaf-cutting of Anthurium.—Mr. Chittenden showed a specimen illustrating a method of reproduction in *Anthurium Dechardi*. Mr. Blakey, at Wisley, had inserted a leaf taken off the plant with its base intact, but without any part of the stem, in sand in a propagating pit. Four buds had been produced on the inner surface of the basal part of the leaf, and numerous roots had developed. Two of the shoots had grown out into rhizomes 10 inches to 12 inches in length, bearing at their tips well-developed plants, and the other two shoots had grown out for a short distance.

Poinciana pulcherrima.—Mr. Jenkins, F.R.H.S., sent a specimen of this plant. It was raised from seeds received from the Gold Coast, where it is known as the Pride of Barbados (it is also called Barbados Fence Flower). The seed was sown in March, 1907, and was raised by Mr. Edward Barber, The Gardens, Brentor, Surbiton. The yellow-flowered *P. Gilliesii*, raised from seeds by the late Rev. H. Ewbank, Ryde, took 12 years to reach the flowering stage. It is interesting to note the sensitiveness of the plant, the leaves folding in a downward direction when exposed to cold, and remaining so when placed in warmth till the stem was split at the base. When this was done the plant showed signs of reviving within an hour or so.

SCIENTIFIC COMMITTEE, DECEMBER 22, 1908.

MR. E. A. BOWLES, F.L.S., in the Chair, and eleven members present.

Calanthe vars.—Mr. Chapman showed two interesting hybrids of *Calanthe*, one of a deep red, the other still deeper in colour. These are interesting on account of the spreading and intensification of the colour, as compared with the original species, *C. vestita* and *C. rosea*. The flower was deep red inside, but almost white externally.

Malformed Cyclamen.—Mr. Crawshay showed an interesting, though not very uncommon, malformation of the Cyclamen where two flowers had been produced in the axils of two of the sepals of an otherwise quite normal flower. All the flowers on the plant, which was a seedling, were similarly malformed.

Apples Decaying.—Mr. Baker showed specimens of an apple with a wide open 'eye' which was decaying from the core inwards. At the 'eye' end of the fruit there was a deposit of some material which was thought to be possibly the remains of a spray fluid. It was taken by Mr. Holmes for further examination.

Albinos among British Wild Flowers.—Mr. Fraser, F.L.S., showed specimens of an albino form of the ordinarily blue *Gentiana campestris*, remarking that he had found it occupying an area of several square yards at an elevation of about 1,000 feet in the Scottish Highlands, while all the plants at a lower elevation were of the usual blue colour. The plant

had evidently come true from seed, and this, he thought, was probably true of the majority of albinos when self-fertilized. There are numerous examples of albino varieties of British wild plants occurring naturally, and Mr. Fraser produced a list which, supplemented by other members, is given: *Papaver Rhoeas*, *Matthiola incana*, *Viola odorata*, *V. hirta lactiflora*, *V. lutea amoena*, *Polygala vulgaris*, *P. serpyllacea*, *P. calcarea*, *Silene acaulis*, *Malva moschata*, *Geranium Robertianum*, *Ononis spinosa*, *Trifolium incarnatum*, *Rubus rusticanus*, *Rosa canina dumalis*, *R. c. surculosa*, *R. dumetorum*, *Epilobium hirsutum*, *Scabiosa Succisa*, *Centaurea nigra*, *Carduus nutans*, *Cnicus palustris*, *C. arvensis*, *Campanula rotundifolia*, *Calluna vulgaris*, *Erica Tetralix*, *Erica cinerea*, *Centaureium umbellatum*, *Gentiana campestris*, *Verbascum nigrum*, *Bartsia Odontites*, *Ballota nigra*, *Thymus Chamaedrys*, *Galeopsis Tetralix*, *Ajuga reptans*, *Polygonum Bistorta*, *Orchis mascula*, *O. maculata*, and *Scilla nonscripta*.

Plants in Bloom.—Mr. Bowles showed specimens of *Felicia petiolaris* gathered from the open in a Wimbledon garden, where the plant has flowered up to the present since the autumn. He also showed specimens of the following species of *Crocus* which were flowering outdoors considerably before their normal period of bloom: *Crocus Imperati* (*monophyllus*) and a depauperate form of the same species, *C. Sieberi*, and *C. chrysanthus*; *C. Imperati* was also shown from Wisley.

Healing of Wounds.—From Mr. Kingsmill came a portion of the trunk of an oak which had, many years ago, a piece of the stem cut off longitudinally. The wood had subsequently grown over the wound thus made, and completely healed it, so that no trace of the wound could be seen from the outside.

Grease Bands.—From Mr. Watkins, orchard foreman to Sir Edmund Loder, Maplehurst, Sussex, came a grease band from an apple tree with an enormous number of Winter Moths (*Cheimatobia brumata* and *Hibernia aurantiaria*), both male and female, adhering to it. Mr. Watkins wrote that when he took the band off nearly 400 male and female moths were upon it, and that there were many bands on which 200 and upwards have been caught. The trees had never been banded before, but now some 10,000 had been done. The Mottled Umber Moth was the first to be caught, but later the Small Winter Moth in much greater abundance. The birds appear to take a great number of the moths from the bands and devour them, particularly the blue tits. Few moths were caught when the bands were first put on (in the first week in October). The larger proportion of females was caught from the middle to the end of November, and a few are still going up. Males were more abundant earlier. The Mottled Umber has been caught chiefly round the edges of the plantation, near the hedges and large oaks.

FLORAL COMMITTEE.

SEPTEMBER 1, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty members present.

Awards recommended :—

Gold Medal.

To Messrs. Carter Page, London Wall, for Dahlias.

Silver-gilt Flora Medal.

To Mr. Perry, Enfield, for herbaceous plants.

To Messrs. Wallace, Colchester, for Montbretias, &c.

Silver-gilt Banksian Medal.

To Messrs. Kelway, Langport, for Gladioli.

Silver Flora Medal.

To Messrs. May, Edmonton, for Carnations.

To Messrs. Veitch, Chelsea, for annuals, shrubs, &c.

To Messrs. Wells, Merstham, for Pentstemons and Chrysanthemums.

Silver Banksian Medal.

To Messrs. Baker, Wolverhampton, for Dahlias.

To Mr. Brazier, Caterham, for Phloxes and Asters.

To Messrs. Gunn, Olton, Birmingham, for Phloxes.

To Messrs. Ware, Feltham, for herbaceous plants.

First-class Certificate.

Ilex Pernyi (votes, unanimous), from Messrs. Veitch, Chelsea. A recently introduced species from China, with neat pyramidal habit, the horizontal branches densely set with dark green glossy leaves ; quite hardy. (Fig. 110.)

Award of Merit.

To Dahlia 'Marathon' (votes, 17 for, 1 against), from Messrs. Stredwick, St. Leonards-on-Sea. A very large-flowered Cactus variety, of exhibition form, rosy-orange, the bases and tips of the rays yellow.

To Dahlia 'Tom Jones' (votes, 15 for, 3 against), from Mr. Mortimer, Rowledge, Farnham. A 'show' variety ; creamy-yellow ground, edged and suffused with mauve-pink.

To *Gladiolus primulinus* hybrids (votes, unanimous), from Messrs. Wallace, Colchester. The strain results from crossing *G. primulinus* and *G. gandavensis* and while the flowers retain the hooded form of the former, a number of delicately beautiful shades of pink and salmon have been introduced by the latter. The hybrids were grown outdoors, and are said to be as hardy as *G. gandavensis*.

To *Gladiolus* 'Golden Measure' (votes, unanimous), from Messrs. Kelway, Langport. A large-flowered yellow self variety, flowering in a well-formed compact spike.

To *Gladiolus* 'White Cloud' (votes, unanimous), also from Messrs. Kelway. Flowers large, cream-white, of fine form.



FIG. 110.—*ILEX PERNYI*. (Veitch.) (P. ccxxviii.)

To *Kniphofia* (*Tritoma*) 'R. Wilson Ker' (votes, 14 for, 2 against), from Messrs. Wallace, Colchester. A bold variety, distinct from others in retaining throughout the spike a rich uniform crimson-scarlet tone.

To *Phlox decussata* 'Friedraulein von Lassberg' (votes, unanimous), from Messrs. Gunn, Olton. Pips large, pure white, truss broad, habit vigorous, 8 feet.

To *Phlox decussata* 'Violet' (votes, unanimous), also from Messrs. Gunn. Pips and truss large, violet, 8 feet; not so deep in colour as 'Le Mahdi,' but clearer.

To *Pteris aquilina* var. *Nicholsonii* (votes, unanimous), from Messrs. May, Edmonton. A distinct and beautiful dark-stemmed, loose-habited evergreen bracken, of obscure origin, doubtfully placed under *P. aquilina*. The original plant was raised by Capt. Pinwell, of Trehane, Cornwall, in a sod of peat containing a Cape Table Mountain Orchid; but a large quantity of fern spores had been introduced from New Zealand, and the plant was probably an escape from these, though no more germinated. The fronds are tough and leathery persisting two to three years, and the rhizomes are more superficial than those of our wild bracken.

To Rose 'Mrs. Littleton Dewhurst' (votes, unanimous), from Messrs. Pearson, Lowdham, Notts. A white sport, faintly tinged, especially in the buds, with pink, of the Wichuraiana rambler, 'Lady Gay.'

To *Tritonia* (*Montbretia*) 'Hereward' (votes, unanimous), from Major Petre, Norwich (gr. Mr. Davison). Flowers pale orange-yellow, large; spike tall, bold and free.

To *Tritonia* (*Montbretia*) 'Norvic' (votes, unanimous), also from Major Petre. A dwarf, compact-habited, but freely-branched variety, with dark stems and yellow flowers, tinged outside and in the bud with red.

Cultural Commendation.

To Mr. Bain (gr. to Sir Trevor Lawrence, Bart., Burford) for *Trichinium Manglesii*. An uncommon, difficult plant, that received a First-class Certificate in 1865.

Other Exhibits.

Messrs. Barr, Covent Garden : hardy plants.

Mr. Brousson, New Eltham : new Dahlias.

Messrs. Bull, Chelsea : foliage plants.

Messrs. Cheal, Crawley : crab apples and ornamental foliage.

Messrs. Eggett, Thames Ditton : hardy ferns.

Messrs. Jarman, Chard : annual Centaureas.

Messrs. Low, Bush Hill Park : miscellaneous plants.

Duke of Newcastle (gr. Mr. Barker) : Phlox 'Clumber White.'

Mr. L. R. Russell, Richmond : Ivies and Clematis.

Mr. Shoesmith, Woking : new Dahlias.

Capt. A. E. Speer, Esher : Dahlias.

Mr. Tomlinson, Streatham : new Caladium.

Mr. Turner, Slough : paeony-flowered Dahlias.

Messrs. Watkins & Simpson, Tavistock Street : annual Asters.

FLORAL COMMITTEE.

SUB-COMMITTEE AT WISLEY, SEPTEMBER 4, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and seven members present.

Dahlias highly commended (XXX) for garden decoration :—

'Emily Habgood' (decorative) (Brousson).

*8. 'Avoca' (Cactus) (Cheal).

9. 'Brightness' (Cactus) (Carpenter).

* See footnote, p. 288.

53. 'Miss Willmott' (Cactus) (Baker).

79. 'Stalwart' (Cactus) (Mortimer).

Other plants highly commended (XXX):—

Phlox decussata 'Comtesse de Jarnac' (Dobbie, Forbes).

Phlox decussata 'Prosper Henry' (Forbes).

Zea japonica gigantea quadricolor (Dammann).

For descriptions see Reports.

FLORAL COMMITTEE, SEPTEMBER 15, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and eighteen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Burrell, Cambridge, for Gladioli.

To Messrs. Dobbie, Marks Tey, for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Veitch, Chelsea, for shrubs, Nerines, &c.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Carnations, &c.

To Messrs. May, Edmonton, for flowering plants.

To Messrs. Paul, Cheshunt, for shrubs.

To Mr. Perry, Enfield, for herbaceous plants.

To Mr. West, Brentwood, for Dahlias.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Begonias.

To Messrs. Cheal, Crawley, for Dahlias.

To Mr. Ll. Gwillim, New Eltham, for Begonias.

To Messrs. Low, Bush Hill Park, for Carnations.

To Messrs. Wells, Merstham, for Chrysanthemums, &c.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for herbaceous plants.

To Mr. F. Brazier, Caterham, for Phloxes, &c.

To Messrs. Clark, Dover, for herbaceous plants.

To Mr. L. R. Russell, Richmond, for Clematis.

To Messrs. Ware, Feltham, for herbaceous plants.

First-class Certificate.

To *Populus lasiocarpa* (votes, 14 for, 4 against), from Messrs. J. Veitch, Chelsea. A recently introduced species from China, said to make a noble tree 20–50 feet in height. Young plants were shown which had withstood the last three winters in the open at the Coombe Wood Nurseries. The leaves of these plants were cordate and about 12 in. long the main veins and leaf-stalks being noticeably red. (Fig. 111.)

Award of Merit.

To Dahlia 'Adela' (votes, unanimous), from Mr. Chas. Turner, Slough. Pom-pon, small and neat; lemon-white.



FIG. 111.—*POPULUS LASIOCARPA*. (Veitch.) (P. cccxxi.)

To Dahlia 'Betty' (votes, unanimous), from Messrs. Cheal, Crawley. Single, rather small; rosy-violet, with maroon-crimson band encircling the yellow disc.

To Dahlia 'Brigadier' (votes, unanimous), from Messrs. Burrell, Cambridge. Cactus, very large with much twisted, incurved claws; orange-red.

To Dahlia 'Flora' (votes, unanimous), from Mr. West, Brentwood. Cactus, with incurved, slightly twisted claws; central florets yellow, with white tips, the outer florets overlaid with soft pink.

To Dahlia 'Monarch' (votes, unanimous), from Messrs. Burrell. Cactus, large; central florets lemon-yellow, abruptly changing to salmon in the outer florets; the twisting of the claws remarkably regular.

To Dahlia 'Nelly Riding' (votes, unanimous), from Mr. West. Cactus, much incurved, rather thin; crimson, florets white-tipped.

To Dahlia 'Satisfaction' (votes, unanimous), from Messrs. Stredwick, St. Leonards. Cactus, very fine form with much incurved twisted quills, rosy-pink, the outer florets paler at the tips and the central florets cream-white.

To Dahlia 'Snowdon' (votes, unanimous), from Messrs. Stredwick. Cactus, with large bold spreading claws; white.

To Dahlia 'Teutonic' (votes, unanimous), from Messrs. Stredwick. Cactus, large spreading claws; carmine-crimson centre, shading to rosy magenta at the floret tips.

Other Exhibits.

Mr. H. L. Brousson, New Eltham: new Dahlias.

Messrs. Bull, Chelsea: stove plants.

Messrs. Eggett, Thames Ditton: hardy ferns.

W. H. B. Fletcher, Esq., Bognor: *Vitis Coignetiae* in fruit.

Misses Hopkins, Shepperton-on-Thames: hardy plants.

Sir Trevor Lawrence, Bart., Dorking: *Cleome gigantea*.

Mr. A. J. Lightfoot, Peckham: Dahlias.

Mr. S. Mortimer, Rowledge, Farnham: new Dahlias.

Messrs. Pennell, Lincoln: *Hedera dentata variegata*.

Mr. W. Peters, Givons Gardens, Leatherhead: Aster 'Lena Peters.'

Mr. H. Shoesmith, Woking: Dahlias.

J. Smellie, Esq., Busby: Chrysanthemums.

Mr. A. R. Upton, Guildford: hardy plants.

Messrs. R. Veitch, Exeter: miscellaneous plants.

FLORAL COMMITTEE.

SUB-COMMITTEE AT WISLEY, SEPTEMBER 18, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and five members present.

Dahlias highly commended (XXX) for garden decoration:—

*24. 'Flash,' from Mr. West, Brentwood.

50. 'May Carpenter,' from Mr. Carpenter, Byfleet.

For description of these varieties, see Report, p. 291.

* See footnote, p. 288.

FLORAL COMMITTEE, SEPTEMBER 29, 1908.

Mr. H. B. MAY in the Chair, and twenty-five members present.

Awards recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for collections of *Vitis*, *Rubus*, *Nepenthes*, &c.

Silver-gilt Banksian Medal.

To J. Gurney Fowler, Esq., Glebelands (gr. Mr. Davis), for Selaginellas.

To Messrs. Ware, Feltham, for Asters and Dahlias.

Silver Flora Medal.

To Messrs. Hill, Lower Edmonton, for *Asplenium Nidus*.

To Messrs. Wallace, Colchester, for herbaceous plants.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Messrs. Cannell, Swanley, for Dahlias, &c.

To Messrs. Frank Cant, Colchester, for Roses.

To Messrs. Cheal, Crawley, for autumn foliage and berries.

To Messrs. Cutbush, Highgate, for Carnations, &c.

To Mr. H. J. Jones, Lewisham, for Asters.

To Messrs. May, Edmonton, for Carnations.

To Messrs. Paul, Cheshunt, for Roses.

To Mr. L. R. Russell, Richmond, for berried shrubs.

To Mr. C. Turner, Slough, for Dahlias, &c.

To Mr. J. West, Brentwood, for Dahlias.

Bronze Banksian Medal.

To Messrs. Bath, Wisbech, for Chrysanthemums, &c.

To J. T. Boase, Esq., Billingshurst, for ornamental gourds.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Wells, Merstham, for Chrysanthemums.

First-class Certificate.

To *Nepenthes* 'Dr. John Macfarlane' (votes, unanimous) (*N. sanguinea* × *N. Curtisii* *superba*), from Messrs. Veitch, Chelsea. Pitchers light maroon-crimson over green, finely marbled at the throat within, nearly cylindric, with a slight constriction about a third from the lid; pitchers about 9 inches in length, their red stalks of the same length from blade to pitcher; blade very large, about 12 × 5 inches.

Award of Merit.

To Carnation 'Winona' (votes, unanimous), from Messrs. Bath, Wisbech. An American tree variety, rich pink, with fringed petals, the calyx and stiff wiry stem excellent, slightly scented; somewhat similar to 'Enchantress,' but deeper in colour.

To *Pennisetum japonicum* (votes, unanimous), from Mr. Amos Perry, Enfield. A very ornamental, rare, hardy grass, with the habit of the Eulalias. Spike simple, cylindric, 4-6 inches in length, enveloped by long spreading purplish bristles, and with a tuft of white bristles at the tip. Leaves narrow. 8 feet.

To *Selaginella Emiliana aurea* (votes, 13 for, 2 against), from Messrs. Hill, Lower Edmonton. A golden form of this useful variety of *S. cuspidata*. Stems much branched, very feathery, bright golden-green, 6-9 inches long.

To *Viola cornuta purpurea* (votes, 14 for, 1 against), from Messrs. Gunn, Olton. Differing from *V. cornuta* only in the colour of its flowers, which are rich violet-blue. Although not possessing the form or size of the commoner varieties, this is a valuable addition to bedding Violas, or to the rockery, from its compact habit, very fine colour, and great freedom of flowering.

On this occasion a Joint Committee of five members of the Floral Committee and five members of the National Dahlia Society's Committee examined the new varieties of Dahlias. Awards of Merit were recommended to the following varieties :—

To Dahlia 'Elsie Turner' (votes, 6 for, 2 against), from Mr. S. Mortimer, Rowledge, Farnham. Cactus; salmon-yellow, yellow at the bases of the large, broad quills; rather rough in form.

To Dahlia 'El Vino' (votes, 5 for, 3 against), from Mr. Mortimer. Show variety; mauve, tipped with purple, the younger florets cream, tipped with purple.

To Dahlia 'Lady Bountiful' (votes, 6 for, 2 against), from Mr. M. V. Seale, Sevenoaks. Single; mauve, with broad maroon-crimson band surrounding the neat yellow disc.

To Dahlia 'Nellie Riding' (votes, 8 for), from Mr. J. T. West, Brentwood. Cactus; crimson-red, the incurved, twisted quills tipped with white.

To Dahlia 'Norah Reynolds' (votes, 8 for), from Mr. Seale. Pom-pon; salmon-red, neat; shown in poor condition, but of unusually good colour.

To Dahlia 'Saxonia' (votes, 5 for, 2 against), from Messrs. Stredwick. Cactus; purplish-crimson, purple at the tips of the nearly straight quills.

To Dahlia 'Wellington' (votes, 7 for, 1 against), from Messrs. Stredwick. Cactus; crimson, a little purplish at the centre and floret tips; flowers very large, with long, twisted, incurved quills.

Cultural Commendation.

To Mr. Davis (gr. to J. Gurney Fowler, Esq., Glebelands, South Woodford), for *Selaginellas*.

To Messrs. Hill, Lower Edmonton, for *Asplenium Nidus*.

Other Exhibits.

Messrs. Backhouse, York: varieties of *Colchicum speciosum*.

Colonel Beddome, West Hill, Putney: hybrid Begonias.

Mr. H. L. Brousson, New Eltham, Kent: Dahlias.

Messrs. Bunyard, Maidstone: Ivy-leaved Pelargonium 'Grenadier.'

- Mr. F. Cozens, Rownhams, Southampton : Dahlias.
 Miss Dixon, Westergate, Chichester : violets.
 M. S. Dunstan, Esq., Shenfield, Essex : Dahlias.
 Messrs. Eggett, Thames Ditton : Scolopendriums.
 Mr. J. Emberson, Walthamstow : Chrysanthemums and Dahlias.
 Mr. A. Ll. Gwillim, New Eltham : Begonias.
 Mary Countess of Ilchester, Holland House : *Crassula impressa*.
 Mr. R. C. Notcutt, Woodbridge : autumn fruits and foliage.
 Mr. W. Parrott, Hextable, Kent : Dahlias.
 Messrs. Peed, Streatham : alpins.
 Mr. G. Reuthe, Keston : rare hardy plants, &c.
 L. de Rothschild, Esq., Gunnersbury House : heaths, &c.
 Mr. W. Seward, Hanwell : new Chrysanthemum.
 Mr. A. R. Upton, Guildford : hardy plants.
 West of England Rose Farm, Henlade, Taunton : Carnation 'Hon.
 R. H. Eden.'

FLORAL COMMITTEE, OCTOBER 13, 1908.

Mr. H. B. MAY in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To the Hon. Vicary Gibbs, Elstree (gr. Mr. E. Beckett, V.M.H.), for
 Asters.

Silver-gilt Banksian Medal.

- To Messrs. Harkness, Hitchin, for Roses.
 To Messrs. Veitch, Chelsea, for Conifers, Begonias, &c.
 To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Flora Medal.

- To Messrs. Cutbush, Highgate, for Carnations.
 To Messrs. Jefferies, Cirencester, for Conifers.
 To Messrs. May, Upper Edmonton, for hardy Ferns.

Silver Banksian Medal.

- To Mr. F. Brazier, Caterham, for Asters, &c.
 To Messrs. Frank Cant, Colchester, for Roses.
 To Mr. H. J. Jones, Lewisham, for Asters.
 To Mr. M. V. Seale, Sevenoaks, for Dahlias, &c.

Award of Merit.

To Aster 'Climax' (votes, unanimous), from the Hon. Vicary Gibbs
 (gr. Mr. Beckett). Inflorescence pyramidal ; flowers 2 inches in diameter,
 a light shade of bright violet, full-rayed ; foliage dark green, the upper
 leaves broad, half-amplexicaul. A variety of *A. Novi-Belgii*, with fine
 bold habit.

To Aster 'Maidenhood' (votes, unanimous), from the Hon. Vicary
 Gibbs. Inflorescence a much branched panicle, the drooping branchlets

closely studded with white flower heads, $\frac{1}{2}$ inch in diameter, with pale yellow disc; free flowering and graceful, apparently a seedling from *A. vimineus*.



FIG. 112.—ROSE 'MRS. EDWARD J. HOLLAND.' New H.T. (*The Garden*.)
(P. ccxxxviii.)

To *Dracaena Bruantii variegata* (votes, unanimous), from Messrs. Cutbush, Highgate. A handsome foliage plant, leaves about $12 \times 1\frac{1}{4}$ inches, tapering at the extremities but not stalked, green, broadly striped with

yellow, and the young leaves suffused with bronze-red. The variegated form appeared to be as vigorous as the type.

To *Nerine* 'Countess of Altamont' (votes, 12 for), from F. D. Godman, Esq., South Lodge, Horsham (gr. Mr. Moody). A vigorous variety, with umbels of ten flowers, the petals twisted at the tips, of good substance, delicate shrimp-pink in colour.

To Rose 'Mrs. Alfred Tate' (votes, unanimous), from Messrs. McGredy, Portadown, Ireland. A Hybrid Tea-rose, strongly tea-scented, pale rosy-flesh in colour, of very little substance, but the buds long and pointed, of exquisite form.

To Rose 'Mrs. Edward J. Holland' (votes, 14 for, 4 against), from Messrs. McGredy. A Hybrid Tea-rose, bright rose-pink in colour, of good form and vigorous habit. (Fig. 112.)

To Rose 'Mrs. Wakefield Christie-Miller' (votes, 16 for, 5 against), from Messrs. McGredy. A Hybrid Tea-rose, silvery-pink within, rich rose-pink on the petal-reverse, in colour similar to 'Grand Duc Adolphe de Luxembourg,' but much more vigorous than that variety, with the stems sturdy and erect. Flowers very large, but rather rough in form. An excellent decorative variety.

Other Exhibits.

- Mrs. Barnard, West Drayton : floral study.
- Messrs. Barr, Covent Garden : hardy plants.
- Messrs. Bath, Wisbech : Chrysanthemum 'Janine Viaux.'
- Messrs. Bunyard, Maidstone : Asters.
- Messrs. Cheal, Crawley : Dahlias.
- Messrs. Clark, Dover : herbaceous plants.
- Messrs. Dobbie, Rothesay : Dahlias.
- Messrs. Eggett, Thames Ditton : hardy ferns.
- Messrs. Heath, Cheltenham : scented-leaved Pelargoniums.
- Misses Hopkins, Shepperton : hardy plants.
- Messrs. Lane, Great Berkhamsted : Roses and Carnations.
- Messrs. Low, Bush Hill Park : Carnations.
- Rev. F. W. Mason, Warwick : Chrysanthemum 'Soleil d'Octobre.'
- Messrs. Paul, Cheshunt : autumn foliage.
- Mr. G. Reuthe, Keston : hardy plants.
- Mr. L. R. Russell, Richmond : berried Aucubas, &c.
- Mr. Seward, Hanwell : Chrysanthemums.
- Messrs. K. Veitch, Exeter : *Nerine Bowdeni*, from the open ground.
- Messrs. Ware, Feltham : herbaceous plants.

FLORAL COMMITTEE, OCTOBER 27, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations, &c.

To Messrs. Hill, Lower Edmonton, for Gleichenias.

Silver Flora Medal.

To Miss Farrer, Acton, for floral studies.



FIG. 113.—CHRYSANTHEMUM 'HILDA LAWRENCE.' (*The Garden.*) (P. cexl.)

Silver Banksian Medal.

To Mr. F. Brazier, Caterham, for Chrysanthemums, Asters, &c.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. Low, Bush Hill Park, for Carnations.

To Messrs. May, Upper Edmonton, for miscellaneous plants.

To Messrs. J. Veitch, Chelsea, for Begonias, &c.

Bronze Banksian Medal.

To Mr. L. R. Russell, Richmond, for berried shrubs.

Award of Merit.

To Chrysanthemum 'Felton's Favourite' (votes, 15 for, 3 against), from Mr. P. Ladds, Swanley Junction. A decorative or market variety, with vigorous habit and stiff stems. Undisbudded sprays were shown with flowers 3 inches in diameter, pure white, and also disbudded plants with flowers 5 inches in diameter, cream-white. Height 3 to 4 feet.

To Chrysanthemum 'Hilda Lawrence' (votes, unanimous), from Mrs. Gregory, Shoreham (gr. Mr. Lawrence). A 'single' variety; flowers pale mauve-rose, about 3 inches in diameter, and with generally three rows of ray florets. Habit vigorous, stalks stout, 3 to 4 feet. (Fig. 113.)

To Chrysanthemum 'H. W. Thorp' (votes, unanimous), from H. W. Thorp, Esq., Worthing. An 'incurved' variety; flowers large, globular, white. (Seedling from 'Buttercup'.)

To Chrysanthemum 'Master David' (votes, unanimous), from Sir Frank Crisp, Henley-on-Thames (gr. Mr. Perkins). A Japanese exhibition variety; flowers large, with broad, scarcely twisted rays; rich crimson, with silver-bronze reverse.

To Chrysanthemum 'Mrs. R. H. B. Marsham' (votes, unanimous), from R. H. B. Marsham, Esq., Bifrons, Canterbury. A Japanese exhibition variety; flowers large, very deep, with long drooping outer rays; white, with occasional faint markings of crimson. (Seedling from 'T. S. Vallis'.)

To Chrysanthemum 'Sir Frank Crisp' (votes, 12 for, 3 against), from Sir Frank Crisp, Henley-on-Thames. A Japanese exhibition variety; flowers large, very deep, with narrower and more numerous rays than the preceding varieties; brick-red in colour, with bronze reverse.

Other Exhibits.

Lady Marcus Beresford, Englefield Green: *Nicotiana tomentosa* variegata.

Hon. Vicary Gibbs, Elstree: *Cornus alba* Gibbsii.

Misses Hopkins, Shepperton: alpines, &c.

A. Kingsmill, Esq., Harrow Weald: *Pernettya mucronata*.

Misses Kipping, Hutton, Essex: alpines, &c.

Mr. A. T. Miller, Leatherhead: Chrysanthemums.

Messrs. Peed, Streatham: alpines.

Mr. G. Reuthe, Keaton: Nerines, &c.

Mr. M. Silsbury, Shanklin: Chrysanthemums.

FLORAL COMMITTEE, NOVEMBER 10, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :

Gold Medal.

To Messrs. Hill, Edmonton, for ferns.

Silver-gilt Flora Medal.

To Messrs. May, Edmonton, for ferns and flowers.

Silver-gilt Banksian Medal.

To E. H. Brown, Esq., Roehampton (gr. Mr. Bradford), for Begonias.

To Rev. H. Buckston, Etwell, Derby (gr. Mr. Sharnbrook), for Cyclamen.

Silver Flora Medal.

To Miss Grace Layton, Bournemouth, for floral studies.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for Pelargoniums.

To Messrs. Cutbush, Highgate, for Carnations, &c.

To G. Ferguson, Esq., Weybridge (gr. Mr. F. W. Smith), for Chrysanthemums.

To Messrs. Peed, Streatham, for Chrysanthemums.

To Messrs. Veitch, Chelsea, for Begonias.

Bronze Floral Medal.

To Messrs. Low, Bush Hill Park, for Carnations.

Bronze Banksian Medal.

To P. Purnell, Esq., Streatham, for flowers and foliage.

To Mr. Simpson, Chelmsford, for single Chrysanthemums.

First-class Certificate.

To *Nephrolepis amabilis* (votes, 15 for, 2 against), from Messrs. Hill, Edmonton. Fronds gracefully arching, dark green, tough, rather narrow, densely clothed with the overlapping, repeatedly forked, broad pinnules. Several fronds also were branched or tasselled at the tips. The fern is a garden form said to have originated from *N. rufescens*, but no other variety of *Nephrolepis* has so complicated a forking of the pinnules.

Award of Merit.

To Begonia 'Clibrans' Pink' (votes, unanimous), from Messrs. Clibrans, Altrincham. This was the best of a series of seedlings raised from *B. socotrana* × a double summer-flowering tuberous variety. Flowers bright rose-pink, double, 2 × 1½ inch, freely borne in pendent clusters, four or five flowers to a spray. (Fig. 114.)

To Chrysanthemum 'Hetty Wells' (votes, 10 for, 2 against), from Messrs. Wells, Merstham. A decorative or market variety; flowers yellowish-buff, with the outer florets of a deeper colour, 6 inches in diameter.

To Chrysanthemum 'Hon. Mrs. Lopes' (votes, unanimous), from Mr. Martin Silsbury, Shanklin, Isle of Wight. A very large exhibition Japanese variety; pale yellow.

To Chrysanthemum 'Purity' (votes, 18 for), from Mr. Silsbury. A Japanese exhibition variety; white.

To *Chrysanthemum* 'R. F. Felton' (votes, 13 for), from Messrs. Wells. A decorative or market variety; petals incurving, of great substance, rich deep yellow.

To *Chrysanthemum* 'Sylvia Slade' (votes, unanimous), from Messrs. Wells. A large-flowered single variety; rich amaranth red, with a narrow white band at the base of the florets, surrounding the yellow disc.



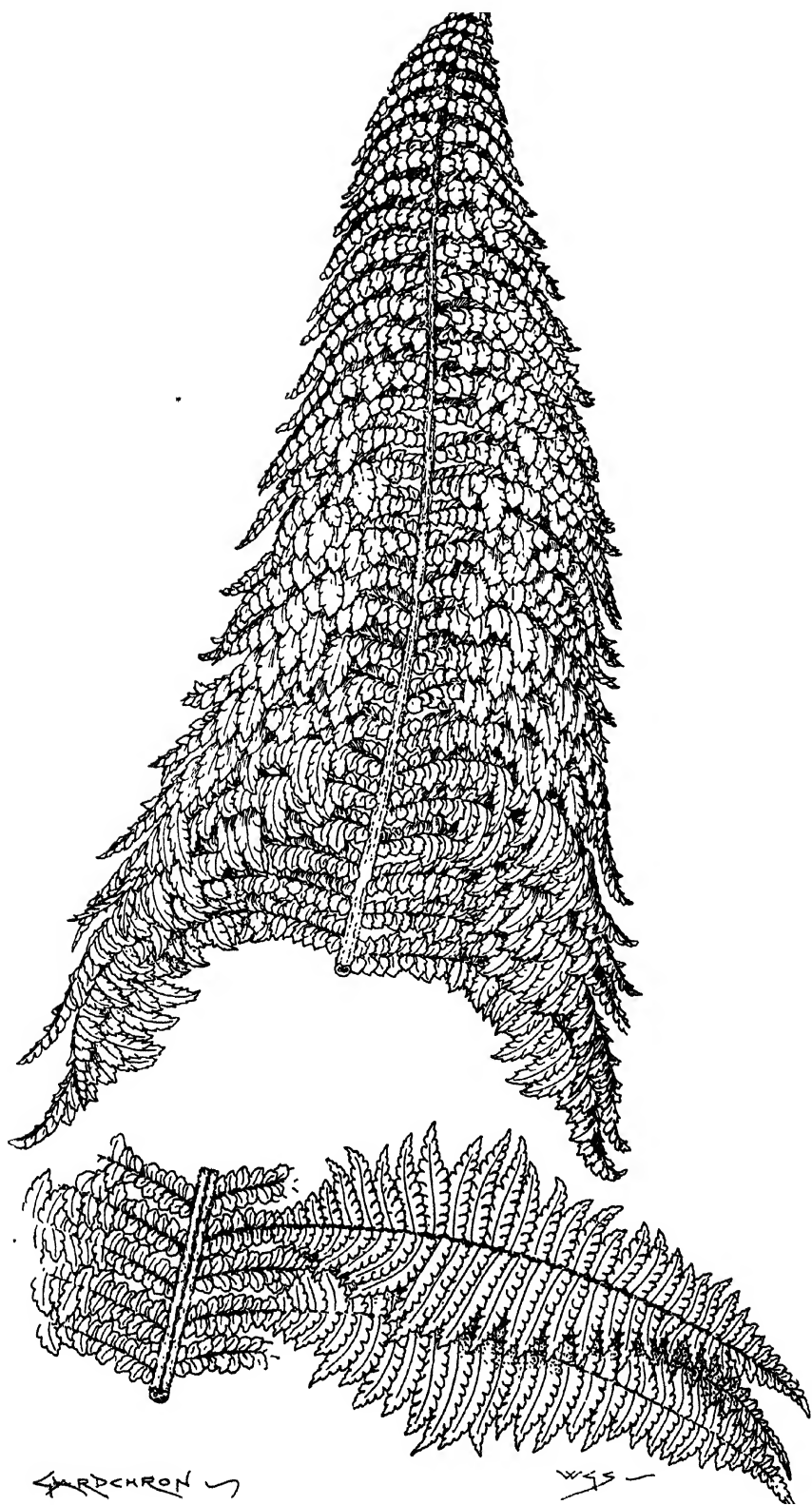
FIG. 114.—*BEGONIA* 'CLIBRAINS' PINK.' (*Gardeners' Chronicle*.) (P. ccxli.)

To *Nephrolepis rufescens* *Mayi ornata* (votes, unanimous), from Messrs. May, Edmonton. Habit erect and vigorous, fronds stout, narrow, densely furnished, but less stiffly erect and more graceful in form than the variety *Mayi*. (Fig. 115.)

Other Exhibits.

P. S. Foster, Esq., Sutton Coldfield : *Chrysanthemum*.

Mr. Isaac Godber, Bedford : *Chrysanthemums*.



GARDCHRON 5

WGS -

F. C. Hill, Esq., Sandown, Isle of Wight : *Begonia semperflorens alba*.
 Misses Hopkins, Shepperton : hardy plants.
 Mr. W. Pingo Horton, Scaford : Chrysanthemums, &c.
 Mr. F. Lilley, Guernsey : Chrysanthemums.
 Mr. W. H. Page, Hampton : Carnations and new Rose.
 Mr. A. H. Peters, Tenterden : Chrysanthemum.
 Mr. E. Potten, Cranbrook : double Pelargonium.
 Mr. C. Robinson, Bletchley : Chrysanthemum.
 Mr. L. R. Russell, Richmond : berried shrubs.
 F. C. Stoop, Esq., Byfleet : Chrysanthemums.

FLORAL COMMITTEE, NOVEMBER 24, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended.

Silver-gilt Flora Medal.

To Mr. Norman Davis, Framfield, Sussex, for Chrysanthemums.
 To Mr. H. J. Jones, Hither Green, Lewisham, for Chrysanthemums.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and foliage plants.
 To Messrs. May, Upper Edmonton, for filmy ferns, &c.
 To Messrs. J. Veitch, Chelsea, for Begonias.

Silver Banksian Medal.

To Adeline Duchess of Bedford, Chenies, Rickmansworth (gr. Mr. Dickson), for *Primula obconica*.
 To Messrs. Cannell, Swanley, for Pelargoniums and Chrysanthemums.
 To Mr. L. R. Russell, Richmond, for Bamboos.
 To Messrs. T. S. Ware, Feltham, for alpiners.
 To Messrs. Wells, Merstham, for Chrysanthemums.

Bronze Flora Medal.

To E. J. Johnstone, Esq., Groombridge (gr. Mr. Paskett), for Begonias.
 To Messrs. Low, Bush Hill Park, for Cyclamen, &c.

First-class Certificate.

To *Aspidium (Polystichum) aculeatum gracillimum* (votes, unanimous), from Mr. C. Druery, Shaa Road, Acton. Pinnules rather distant, irregularly serrate, linear, sometimes as much as 1½ inch long ; fronds broad, very slender, arching. Derived from *Aspidium aculeatum pulcherrimum* (F.C.C. 1907) this is, perhaps, the most beautiful form of the common hard shield-fern that has come before the Committee.

Award of Merit.

To Chrysanthemum 'Caledonia' (votes, 16 for, 4 against), from Mr. G. Williams, Cardiff. Single ; bright mauve-rose, with yellow disc encircled by a ¼-inch wide band of white, derived from the bases of the ray

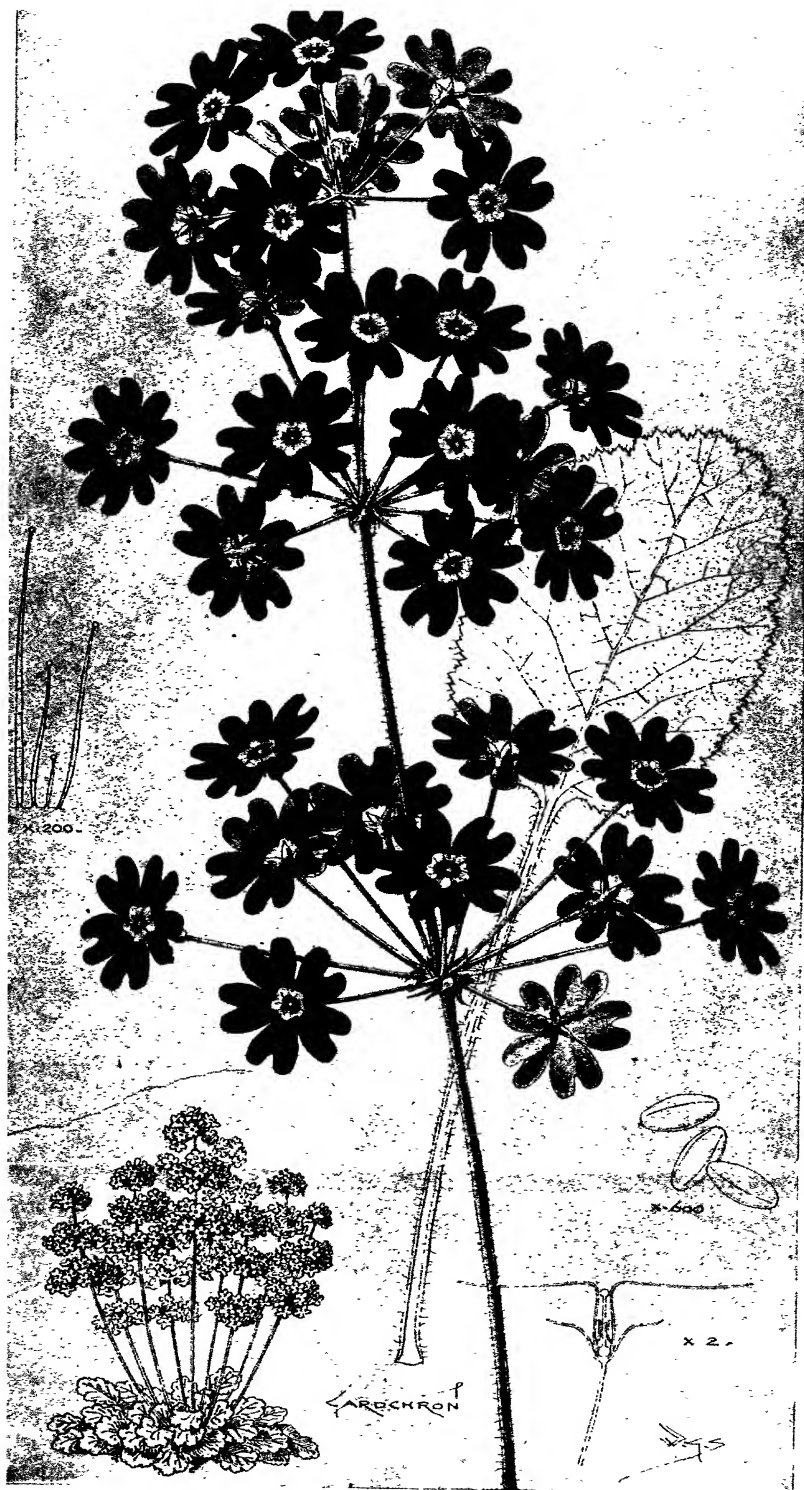


FIG. 116.—*PRIMULA MALACOIDES*. (*Gardeners' Chronicle*.)

(To face page cxlv.)

To Messrs. May, Edmonton, for foliage and flowering plants.

To Messrs. J. Veitch, Chelsea, for Begonias, Carnations, &c.

Silver Banksian Medal.

To Messrs. Peed, Streatham, for Carnations.

To Messrs. Ware, Feltham, for alpinas and Carnations.

Award of Merit.

To Chrysanthemum 'Ball of Gold' (votes, 18 for), from Messrs. Bath, Wisbech. Flowers pale yellow, petals incurved. A strong stemmed, free-flowering variety, recommended by the Committee on account of its suitability for market work. (Sport from 'Snowdrift'.)

Other Exhibits.

Messrs. Blackmore & Langdon, Twerton-on-Avon: new Carnation.

Colonel Bosworth, Roehampton: new Chrysanthemums.

Messrs. Chatfield, Southwick, Brighton: Chrysanthemums.

Mr. A. Dewar, Kilmarnock: new Chrysanthemum.

Mr. A. F. Dutton, Iver, Bucks: Carnations.

First Garden City, Limited, Letchworth: designs for small gardens.

Miss Hopkins, Shepperton: alpinas, &c.

Mr. Frank Lilley, Guernsey: new Chrysanthemum.

Mr. E. Potten, Cranbrook: Pelargonium 'Double Paul Crampel.'

Mr. J. C. Russell, Taunton: new Chrysanthemum.

Mr. H. W. Thorp, Worthing: new Chrysanthemum.

Mr. G. H. Varley, Worthing: new Chrysanthemum.

Messrs. Wells, Merstham: Chrysanthemums.

FLORAL COMMITTEE, DECEMBER 22, 1908.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for hardy evergreen shrubs and greenhouse plants.

Silver-gilt Flora Medal.

To Messrs. W. Cutbush, Highgate, for berried shrubs, Carnations, &c.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Pelargoniums and Begonias.

Silver Banksian Medal.

To Messrs. H. B. May, Upper Edmonton, for Ferns.

Bronze Flora Medal.

To Messrs. Hugh Low, Bush Hill Park, for Carnations, &c.

First-class Certificate.

To *Acanthus montanus* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A shrubby species from West Africa, described in 1864, but

very rare in cultivation. The plant exhibited was about 15 inches high. Leaves opposite, rigidly spreading, a little fleshy and brittle; beautifully mottled with light and dark green, the paler shade following the main net-veins; the margin broken into about six saw-like lobes terminating in bristles, a few bristles also rising from the centre of the divisions of the upper surface of the leaf, and the lower surface scabrid, especially on the veins; leaves about 12 inches in length by 4 in width. Inflorescence about 8 inches in length, the spike close-flowered, erect, with pinkish bracts and calyces and white corolla, of which the lip was over an inch in diameter.

Award of Merit.

To *Sarcococca ruscifolia* (votes, 12 for), from Messrs. J. Veitch. A hardy evergreen shrub recently introduced from China, where it was found at altitudes of 6,000 to 10,000 feet. Leaves ovate, acute, glossy dark green above, pale green below, shortly stalked, about $1\frac{1}{4}$ inch in length by $\frac{1}{2}$ inch in width. Flowers insignificant, greenish-white, in small close axillary clusters, scented. A close relation of the Box, which it resembles in the colour and texture of the foliage, but which it out-distances in the vigour of its growth. Judging from the freedom with which branching had taken place on a shoot from which the tip had been removed it would appear to be very amenable to trimming.

Other Exhibits.

Mr. H. Haskins, Bournemouth : Chrysanthemum seedling.

Mr. W. Pingo Horton, Seaford : miscellaneous flowers.

Mr. F. J. McBean, Plumpton, Sussex : Chrysanthemum sport.

Messrs. Paul, Cheshunt : *Calceolaria* and *Montanoa*.

Mr. H. Prothero, Stonehouse : Chrysanthemum seedling.

Mr. G. Reuthe, Keston : hardy flowers.

FRUIT AND VEGETABLE COMMITTEE.

SUB-COMMITTEE AT WISLEY, AUGUST 25, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and nine members present.

Awards Recommended :—

Award of Merit.

Parsley.

(1) Fern leaf type.

*17. Sutton's Garnishing (Sutton). **A.M.**

28. Johnson's Perfect (Johnson). **A.M.**

(2) Curled type.

1. Beauty of the Parterre (Carter). **A.M.**

6. Emerald Green (Carter). **A.M.**

7. Extra Double Curled (Carter). **A.M.**

24. Myatt's Extra-fine Garnishing (Barr). **A.M.**

29. Moss-curved (Nutting). **A.M.**

Tomato.

Lye's Early Prolific (Wadds). **A.M.**

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 1, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :

Gold Medal.

To Messrs. Bunyard, Maidstone, for fruit trees in pots, &c.

To King's Acre Nurseries, Hereford, for fruit trees in pots.

Hogg Medal.

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. G. Reynolds), for Pineapples, &c.

Silver Knightian Medal.

To Messrs. Cannell, Eynsford, for fruit trees in pots.

Silver Banksian Medal.

To W. Astor, Esq., Cliveden, Taplow (gr. Mr. Camm), for Grape 'Madresfield Court.'

To Messrs. Peed, Streatham, for a collection of Apples, &c.

Other Exhibits.

Mrs. Ames, Westbury-on-Trym : Pear 'Doyenné Boussoch.'

Mr. T. Clark, Histon, Cambs. : seedling Plum.

* See footnote, p. 52

Messrs. H. Low, Bush Hill Park : Raspberry 'Low's Perpetual.'

Mr. M. H. Matthews, New Southgate : seedling Apple.

Mr. G. W. Miller, Wisbech : Apple 'Red Victoria.'

Mr. H. Pack, Sholing, Hants : Tomato 'Pack's Excelsior.'

Messrs. R. Smith, Worcester : seedling Plum.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 15, 1908.

Mr. J. CHEAL in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. J. Veitch, Chelsea, for vegetables.

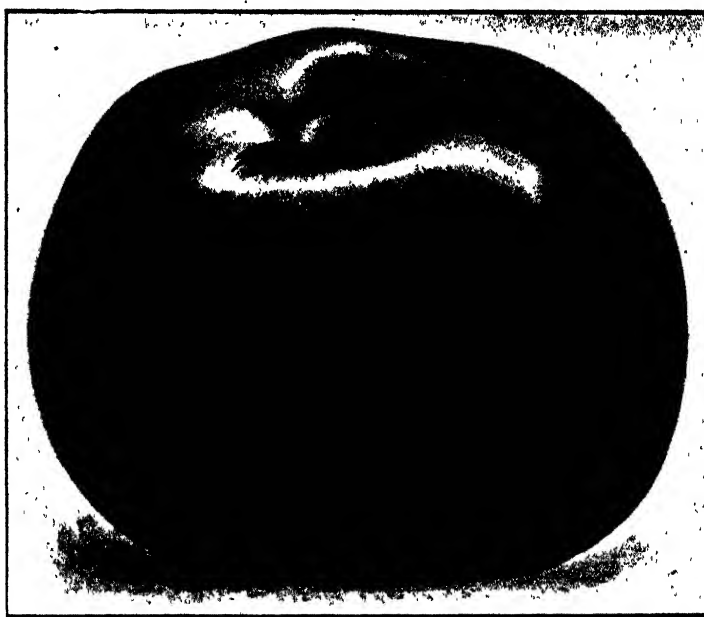


FIG. 117.—APPLE 'RED VICTORIA.' (*Journal of Horticulture.*)

Silver Knightian Medal.

To Lady Northcliffe, Sutton Place, Guildford (gr. Mr. Goatley), for Melons.

Silver Banksian Medal.

To Messrs. Carter Page, London Wall, for Tomatos.

Award of Merit.

To Apple 'Red Victoria' (votes, unanimous), from Mr. G. W. Miller, Wisbech. Fruit large, deep round, slightly ribbed ; very highly coloured, minute spots of red ; eye closed, set in deep-furrowed basin, segments long ; stalk thin, very short, set in deep wide cavity : flesh white, very

juicy: an early culinary variety, said to be a good grower and free cropper. (Fig. 117.)

Cultural Commendation.

To C. Tuffin, Esq., West Dulwich, for Apple 'Grenadier.'

Other Exhibits.

Mr. A. W. Chillery, Withycombe, Exmouth: seedling Apple.

F. H. Cook, Esq., Womersley, Guildford: new Melon.

Mrs. Reg. Hill, Coggeshall Essex: giant puffball (*Lycoperdon giganteum*).

Hon. A. H. T. de Montmorency, Carrickmines, Co. Dublin: new Peach.

Messrs. Searle, Chipping Ongar: seedling Nectarine.

Messrs. R. Smith, Worcester: seedling Plum.

Mrs. Trotter, Barnet: new Grape.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 22, 1908.

SUB-COMMITTEE AT WISLEY.

Mr. OWEN THOMAS, V.M.H., in the Chair, and nine members present.

The following varieties of Beet and Potatos were highly commended (XXX).

Beet:—

*36. Willow-leaved (for ornamental purposes), from Messrs. Dobbie, Rothesay.

37. Sutton's Blood Red, from Messrs. Sutton, Reading.

40. Sutton's Pineapple, from Messrs. Sutton, Reading.

Potato:—

64. Devanha Seedling, from Messrs. W. Smith, Aberdeen.

84. British Champion, from Mr. G. Carter, Cottenham.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 29, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Messrs. Dobbie, Rothesay, for Potatos.

Silver-gilt Banksian Medal.

To Miss Nicholl, Ashley Gardens, S.W., for Navel Oranges

To Mr. R. C. Notcutt, Woodbridge, Suffolk, for Apples.

Silver Knightian Medal.

To Messrs. Lane, Great Berkhamsted, for Vines in pots.

First-class Certificate.

To Grape 'Prince of Wales' (votes, unanimous) from R.H.S. Gardens, Wisley. This variety, said to be a sport from Mrs. Pince, received an Award of Merit when shown by Messrs. J. Veitch on September 25, 1900. The berries are large, oval, blue-black, and of very good, slightly Muscat flavour; bunches large, long, tapering, very handsome; long keeping.

Award of Merit.

To Apple 'Renown' (votes, 17 for, 5 against) from Colonel Archer-Houblon, Newbury (gr. Mr. Chas. Ross). A seedling from Peasgood's Nonsuch \times Cox's Orange, very similar in appearance to Emperor Alexander (fig. 118).

To Oranges 'Renwick Navel' (votes, 8 for) and 'Washington Navel' (votes, unanimous) from Miss Nicholl, Ashley Gardens, S.W. Fruits large, handsome in appearance, rich in colour, very fine in flavour; grown in South Australia.

To Beets:

*36. Willow-leaved (for ornamental purposes), from Messrs. Dobbie, Rothesay.

37. Blood Red, from Messrs. Sutton, Reading.

40. Pineapple, from Messrs. Sutton, Reading.

To Potatos:

64. Devanha Seedling, from Messrs. W. Smith, Aberdeen.

84. British Champion, from Mr. G. Carter, Cottenham, Cambs.

The Beets and Potatos were grown in the Society's Gardens at Wisley, and were the varieties highly commended by the Sub-Committee at the trial grounds on September 22. Samples of each variety were cooked and placed before the full Committee, and Awards of Merit were then unanimously recommended. For descriptions see reports of trials at Wisley, p. 509 and p. 525.

Cultural Commendation.

To Messrs. S. T. Wright and A. C. Smith, R.H.S. Gardens, Wisley, for 31 varieties of Grapes.

To Mr. W. Cobb, Rusper, for apple 'Charles Ross.'

To Mr. C. Foster, University College, Reading, for Apple 'James Grieve.'

To Messrs. R. Veitch, Exeter, for Apple 'Gravenstein.'

Other Exhibits.

R. C. Appleton, Esq., Beverley, Yorks: fruitful Bramble.

Mr. E. Burden, King's Heath, Birmingham: seedling Apple.

Mr. J. Charlton, Tunbridge Wells: new Apple.

Mr. W. Jerome, Stanley Road, Teddington: seedling Apple.

Messrs. Low, Bush Hill Park: perpetual fruiting Raspberry.

Messrs. Paul, Cheshunt: Strawberry 'Reine d'Août.'

Mr. A. E. Reynolds, Lyncombe Vale, Bath: seedling Apple.

Mr. M. Roe, Pomona Fruit Farm: Apples.

* See footnote, p. 525.

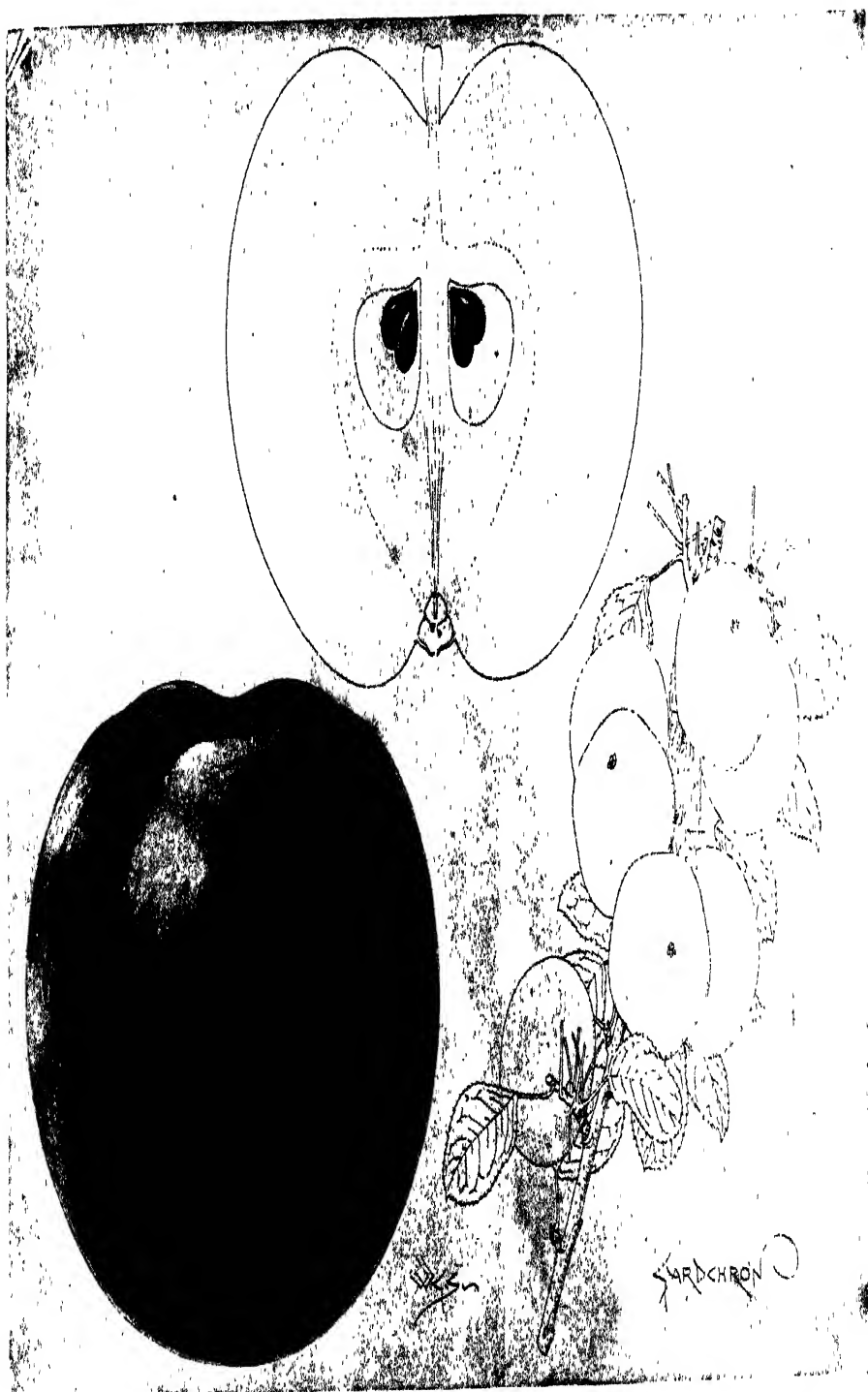


FIG. 118.—APPLE 'RENOWN.' (*Gardeners' Chronicle*.)

(To face page cci.)

W. Roupell, Esq., Roupell Park, S.W. : 'Sultana' Grape.
 Mr. W. T. Royle, Colwyn Bay : Tomato 'Pyrus.'
 Messrs. Spooner, Hounslow : seedling Apple.
 Mr. J. Watkins, Maplehurst, near Horsham : new Apple.

Extract from the Minute Book of the Council :—' Among the exhibits in the day's Show was a magnificent and highly interesting and instructive collection of 31 varieties of grapes sent from the Society's Garden at Wisley. They were considered to be the finest exhibit of grapes ever shown from one garden. The Council summoned Mr. S. T. Wright and Mr. A. C. Smith (the Superintendent and Assistant Superintendent), and the President offered a few words indicative of the appreciation by the Council of the energy and skill which had produced such a remarkable exhibit in so short a time—3 years from the eye.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 13, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Hogg Medal.

To Lieut.-Col. Borton, Cheveney, Hunton (gr. Mr. J. Whittle), for Apples.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Apples.

Cultural Commendation.

To Mr. Jas. Webber, Minehead, for Apple 'Charles Ross.'

Other Exhibits.

Mr. J. Basham, Bassaleg, Newport, Mon. : Crab 'Fairy.'
 Mr. E. Bird, Badley, Daventry : Apples.
 B. E. C. Chambers, Esq., Haslemere : Servian Quinces.
 Mr. F. Clipstone, Market Harborough : seedling Apple.
 A. Davidson, Esq., Great Chesterford : Apple 'Susan Davidson.'
 Mr. J. Dutton, Ham Arch Nurseries, Worthing : seedling Cucumber.
 C. C. Ellison, Esq., Bracebridge, Lincoln : Apple 'Ellison's orange.'
 Mr. H. Jeffree, Old Bell Hotel, Wisbech : Apple 'Deudney's seedling.'
 W. Lawman, Esq., Southgate : Apple 'Lawman's seedling.'
 J. Leakey, Esq., Sydenham : Grape 'Brandt.'
 Lady Londonderry, Stockton-on-Tees : grape 'Hanipoot.'
 Mrs. Miller, Marlow : Chutney and Preserves.
 Mr. G. Pyne, Denver Nurseries, Topsham : Apple 'Pyne's Pearmain.'
 Mr. H. M. Roberts, Tring : Apple 'Ivinghoe Beauty.'
 Mr. Ross, Ham Court, Upton-on-Severn : seedling Melon.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 15, 1908.

AUTUMN FRUIT SHOW.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirty members present.

[For awards by the Council in the Competitive Exhibits see p. exc.]

Silver Banksian Medal.

Mrs. Arnold, Dedham, for old English Apples.

Cultural Commendation.

To Mr. Harvey (gr. to Mrs. Thornhill), Bakewell, for Seville Oranges.

Other Exhibits.

O. G. S. Croft, Esq., Pomona Fruit Farm, Hereford : seeding Apple.

Mr. Geo. E. Dyke, Milborne Port, Somerset : Apple 'Dyke's seedling.'

Mr. W. A. Herring, Lincoln : Apple 'Herring Pippin.'

E. Leroy, Esq., East Molesey : fruits of *Passiflora caerulea*.

Messrs. Merryweather, Southwell : Apple 'Crimson Bramley.'

P. H. Miller, Esq., Moyleen, Marlow : Strawberries, Walnuts, &c.

Mr. W. H. Redshaw, Bourne : seedling Apples.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 27, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :

Silver-gilt Hogg Medal.

To Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.

Silver Knightian Medal.

To Messrs. Hugh Low, Bush Hill Park, for Apples.

Silver Banksian Medal.

To Mr. R. W. Green, Wisbech, for Potatoes.

To W. H. Whiteley, Esq., Torquay, for Apples.

Other Exhibits.

Mr. W. Allan, Gunton Park : Raspberry 'Alexandra.'

Messrs. Bath, Wisbech : Pear 'Bath's Productive.'

Mr. A. Faulknor, Inkpen, nr. Hungerford : nuts.

W. Heywood Esq., Watlingford, Bowdon : Apples.

Sir E. Loder, Maplehurst, Horsham : Apple 'White Holland Pippin.'

A. Ries, Esq., Fitzjohn's Avenue, Hampstead : seedling Apples.

Mr. R. Sutterby, St. John's Fen End, Wisbech : seedling Apples.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 10, 1908.

Mr. A. H. PEARSON in the Chair, and fifteen members present.

Award Recommended :

Silver-gilt Knightian Medal.

To the Duke of Rutland, Grantham (gr. Mr. W. H. Divers), for a collection of fruit.

Other Exhibits.

Messrs. Allen and Hoar, West Hampstead : seedling Apple.

Rev. H. Herbert, St. Ives, Hunts : seedling Apple.

Messrs. Hugh Low, Bush Hill Park : Apples.

Rev. H. Rollo Meyer, Ampthill : new Apple.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 24, 1908.

Mr. J. CHEAL in the Chair, and nineteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To J. G. Williams, Esq., Pendley Manor, Tring, for Apples.

Silver Banksian Medal.

To Sir Edmund G. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), for Apples and Pears.

To Messrs. Massey, Spalding, for Potatos.

Award of Merit.

To Pear 'Dana's Hovey' (votes, 12 for), from Messrs. J. Veitch, Chelsea. Fruit of medium size, obovate, regular ; skin greenish-yellow, dotted and veined with russet ; eye open, in a shallow basin ; stalk about an inch long ; flesh yellowish, sweet, melting, but a little inclined to be gritty. An old but useful variety ; in season from November to January.

Cultural Commendation.

To Rt. Hon. the Earl of Ducie, Tortworth Court, Gloucester, for fruits of *Diospyros costata*.

Other Exhibits.

Messrs. Bonfiglioli, Bologna, Italy : coreless Apple.

Miss Martin, Willowbrook, New York : bottled fruits.

Mrs. Miller, Moyleen, Marlow : Chutney and bottled fruits.

Rev. T. Sheepshanks, Chudleigh, Devon : Pears.

Messrs. Spooner, Hounslow : Apple 'Hounslow Wonder.'

W. A. Voss, Esq., Rayleigh : new Apple.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 8, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Banksian Medal.

Mr. D. W. Bedford, The Braes, Berkhamsted : Onions.

Other Exhibits.

Messrs. Barr, Covent Garden : new Apple.

Mr. John Garland, Broadclyst, Devon : new Apple.

Mr. W. Peters, Givons Gardens, Leatherhead : fruit storing trays.

Mr. E. Potten, Cranbrook : new Apple.

H. Wretts Smith, Esq., Ilford : new Apple.

Messrs. Spooner, Hounslow : new Apple.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 22, 1908.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. J. Veitch, Chelsea, for Apples.

Hogg Medal.

To Lord Harrington, Elvaston Castle, Derby (gr. Mr. Goodacre), for Muscat of Alexandria Grapes.

Silver Knightian Medal.

To Messrs. Cannell, Eynsford, Kent, for Apples.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Apples.

First-class Certificate.

To Apple 'Encore' (votes, unanimous), from Colonel Archer-Houblon, Welford Park, Newbury (gr. Mr. Charles Ross). A cooking Apple (raised from 'Warner's King' × 'Old Northern Greening') that was unanimously recommended an Award of Merit, December 11, 1906. For description see JOURNAL, Vol. xxxii., 1907, p. cxlix.

Award of Merit.

To Apple 'William Crump' (votes, unanimous), from Mr. W. Crump, V.M.H., Madresfield Court Gardens, Malvern. Fruit of medium size and regular shape; eye closed, with erect segments, in a shallow basin; stalk very short, deeply inserted; skin red, striped, russety round the stalk; flesh crisp, of good flavour. A dessert variety raised from Cox's 'Orange Pippin' × 'Worcester Pearmain.'

Other Exhibits.

Sir E. Loder, Bart., Maplehurst, Horsham : Apples.

Mr. F. W. Seabrook, Ramsey Abbey, Hunts : new Apple.

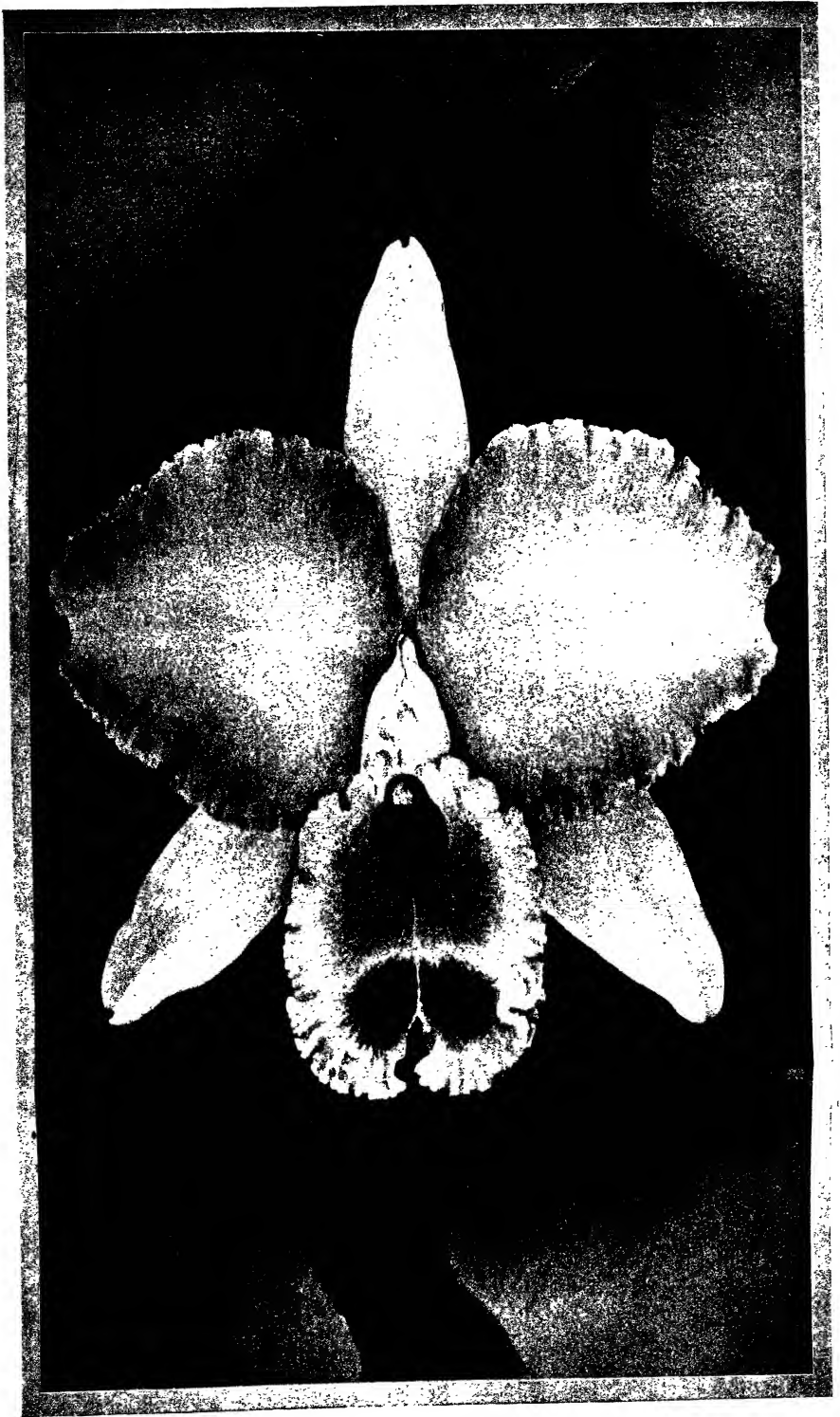


FIG. 119.—*CATTLEYA MENDELI* 'HIS MAJESTY THE KING.'
(F.C.C. May 26, 1908. See page cliv.)

(To face page cliv.)

ORCHID COMMITTEE.

SEPTEMBER 1, 1908.

Mr. H. J. VEITCH, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, West Hill; Putney (gr. Mr. Day), for a group.

To Messrs. Charlesworth, for hybrid Orchids.

To Messrs. Sander, for a group.



FIG. 120.—CATASETUM RUSSELLIANUM. (*Journal of Horticulture.*)

Silver Banksian Medal.

To Messrs. Moore, Rawdon, for a group.

First-class Certificate.

To *Brasso-Cattleya* × 'Madame Chas. Maron,' Sander's variety (*B. Digbyana* × *C. Warscewiczii*) (votes, 10 for, 8 against), from Messrs. Sander. Flowers large and of fine shape; deep purplish rose with pale yellow centre to the lip.

Award of Merit.

To *Catasetum Russellianum* (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A distinct species with whitish flowers marked with green lines and veining. (Fig. 120.)

To *Sophro-Laelio-Cattleya* × *Danae superba* (*C. Harrisoniana* × *S.-L. laeta Orpetiana*) (votes, unanimous), from Lieut.-Col. G. L. Holford,

C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A dwarf plant with flowers of the shape and substance of those of *C. Harrisoniana*, but larger, cream, tinged with rose-purple; lip yellow with a purple front.

To *Laelio-Cattleya* × 'Elva' var. 'St. Vincent' (*C. Warszewiczii* × *L.-C. Ingramii*) (votes, unanimous), from H. S. Goodson, Esq. (gr. Mr. Day). Flowers deep rose with dark ruby-purple lip, having a large yellowish blotch on each side.

To *Cattleya* × 'Rhoda' (× 'Iris' × *Hardyana*) (votes, 9 for, 2 against), from Messrs. Charlesworth. The original form in the collection of J. Gurney Fowler, Esq., is shaped like *C. × Hardyana*, the present variety like *C. × 'Iris'*. Sepals and petals apricot yellow, tinged with red; lip ruby-red with lighter margin.

Botanical Certificate.

To *Catasetum Imschootianum*. Flowers yellowish-green, fleshy, and globular in form.

To *Calanthe Ceciliae*, of the *C. Masuca* class. Flowers pale lavender, with a purple spot at the base of the lip.

To *Cymbidium lancifolium*. Flowers on erect spikes, white with purple lines on the petals and lip.

These three plants were exhibited by Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White).

Other Exhibits.

Sir Trevor Lawrence, Bart. : rare Orchids.

Lieut.-Col. G. L. Holford : four hybrids.

Messrs. W. Bull : hybrid *Cattleyas*.

Messrs. Stanley : a group.

Mr. A. W. Jensen, Lindfield : *Vanda coerulea Jenseniana*, a small form with mauve labellum.

A. G. Groves, Esq., Bristol (gr. Mr. Gostling) : a fine specimen of *Cypripedium* × 'Kubele' *grandis*.

Mr. G. W. Miller, Wisbech : *Laelio-Cattleyas*.

B. G. Thwaites, Esq. (gr. Mr. Black) : varieties of *Cattleya* × 'Adula.'

ORCHID COMMITTEE, SEPTEMBER 15, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day), for a group.

To Messrs. Charlesworth, Heaton, Bradford, for hybrid Orchids.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Moore, Rawdon, for a group.

To Messrs. Stanley, Southgate, for *Cattleyas* and *Cypripediums*.

To Messrs. Cypher, Cheltenham, for a group.

To Messrs. Hugh Low, Enfield, for a group.



FIG. 121.—*CATTELEYA HARRISONIANA ALBA*, STANLEY'S VARIETY. (*The Garden.*)

First-class Certificate.

To *Cattleya Harrisoniana alba*, Stanley's variety (votes, unanimous), from Messrs. Stanley, Southgate. Flower pure white with yellow zone on the lip, and larger than the original form. (Fig. 121.)

Award of Merit.

To *Cattleya* × *Maronii aurea* (*velutina* × *Dowiana aurea*) (votes, unanimous), from Sir Trevor Lawrence, Bart., K.C.V.O., Burford (gr. Mr. W. H. White). Sepals and petals clear citron yellow; lip rose-crimson with gold veining from the base.

Other Exhibits.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander): three new hybrids.

R. G. Thwaites, Esq., Streatham (gr. Mr. Black): varieties of *Cattleya* × 'Adula' (*bicolor* × *Hardyana*).

Messrs. Wm. Bull, Chelsea: varieties of *Cattleya* × 'Iris,' &c.

ORCHID COMMITTEE, SEPTEMBER 29, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To H. S. Goodson, Esq., Fairlawn, West Hill, Putney (gr. Mr. G. E. Day), for a group.

Silver Flora Medal.

To Messrs. Charlesworth, Heaton, Bradford, for a group.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Cypher, Cheltenham, for a group.

First-class Certificate.

To *Cattleya* × 'Venus' ('Iris' × *Dowiana aurea*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day). A very fine hybrid. Sepals and petals broad, golden-yellow tinged with reddish-bronze; lip deep ruby-red, with gold veining from the base to the centre. (Fig. 122.)

To *Odontioda* × *Charlesworthii*, Goodson's variety (*Odontoglossum Harryanum* × *Cochlioda Noezliana*) (votes, 18 for, 8 against), from H. S. Goodson, Esq. (gr. Mr. G. E. Day). Flowers larger than the original, reddish-scarlet with yellow markings on the crest. (Fig. 128.)

To *Cypripedium* × 'Actaeus Bianca' (*Lecanum* 'Prospero' × *insigne Sanderæ*) (votes, unanimous), from Lieut.-Colonel G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A great improvement on the favourite *C. insigne Sanderæ*, which it resembles, but the flowers are larger. Dorsal sepal pure white with a well-defined yellowish-green base; the rest of the flower is pale yellow. (Fig. 124.)

To *Cattleya* × 'Rutilant' (*Maronii* × *Fabia Vigeriana*) (votes, unanimous), from M. Chas. Maron, Brunoy, France. Flowers as large as those of *Cattleya labiata* and almost entirely of a glowing reddish-crimson colour. (Fig. 125.)



FIG. 122.—CATTLEYA × 'VENUS.' (*Gardeners' Chronicle*)

(To face page cclvi)

Award of Merit.

Sophro-Cattleya × 'Saxa,' Westonbirt variety (*S. grandiflora rosea* × *C. Trianaei*) (votes, unanimous), from Lieut.-Colonel G. L. Holford,



FIG. 123.—*ODONTIODA* × *CHARLESWORTHII*, GOODSON'S VARIETY. (*The Garden*.
(P. cclviii.)

C.I.E., C.V.O. (gr. Mr. H. G. Alexander). Plant dwarf; flower three inches across; sepals and petals deep rose-purple; lip orange on the lower half, the front and margins of the side lobes claret-purple.

To *Laelio-Cattleya* × 'Golden Oriole,' Goodson's variety (*L.-C. Charlesworthii* × *C. Dowiana* 'Rosita') (votes, unanimous). Flowers golden-yellow heavily marked with deep bronzy-red.

To *Oncidium incurvum* (votes, 12 for, 6 against), from Baron Sir. H. Schröder, The Dell, Egham (gr. Mr. H. Ballantine). A graceful Mexican species which first flowered in England in 1840. Flower-spikes



FIG. 124.—*CYPRIPEDIUM* × 'ACTAEUS BIANCA.' (*Gardeners' Chronicle*.) (P. cclviii.)

four feet in length, branched, and bearing numerous white and rose flowers.

Botanical Certificate.

To *Catasetum maculatum*, from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Flowers large, on erect spikes, fleshy, greenish, the lip and petals spotted with light purple.

To *Acineta densa*, from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). An old species with a pendulous raceme of large wax-like yellowish flowers faintly spotted with rose.

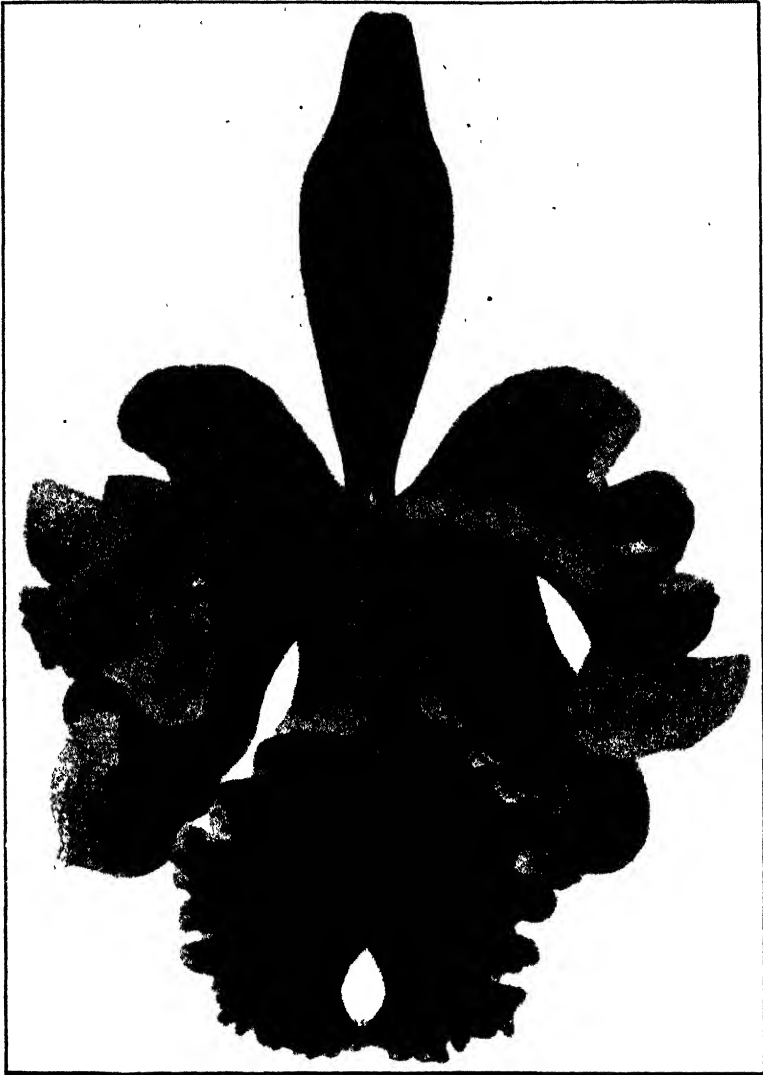


FIG. 125.—CATTLEYA × 'RUTHANT.' (*Journal of Horticulture*.) (P. cclviii.)

To *Habenaria geniculata*, from Sir Trevor Lawrence, Bart, K.C.V.O. (gr. Mr. W. H. White). A slender species from Darjeeling with white flowers bearing green spurs two inches in length.

Cynorchis purpurascens, from Sir Trevor Lawrence, Bart. A terrestrial Orchid with shining green leaves and rose-purple flowers, each an inch in diameter. Native of Madagascar.

Cirrhopetalum Andersonii, from Sir Trevor Lawrence, Bart. A dwarf species with umbels of whitish flowers spotted with lilac.

Other Exhibits.

Messrs. Moore, Rawdon : a group.

Monsieur Chas. Maron, Brunoy, France : hybrid Orchids.

H. T. Pitt, Esq. : *Odontoglossum grande Pittianum*.

F. J. Hanbury, Esq. : *Cypripedium Fairrieianum*, Brockhurst variety.

ORCHID COMMITTEE, OCTOBER 13, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day), for a group.

To Henry Little, Esq., Baronshalt, Twickenham (gr. Mr. Howard), for a group representing *Cattleya Bowringiana* and its hybrids.

To Messrs. Sander, St. Albans, for a group of *Vanda coerulea*, &c.

To Messrs. Charlesworth, Hayward's Heath, for a group.

To Messrs. Cypher, Cheltenham, for a well-arranged group of *Cypripediums*, *Dendrobiums*, &c.

To Miss M. Walters Anson, Streatham, for a collection of paintings.

Silver Banksian Medal.

To Messrs. Moore, Rawdon, for *Cattleyas*, &c.

To Messrs. Stanley, Southgate, for *Cattleya labiata*, &c.

To Messrs. McBean, Cooksbridge, for *Odontoglossums*.

To Monsieur Mertens, Ghent, for hybrid *Odontoglossums*.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Laelio-Cattleya* × 'St. Gothard' (*L.-C.* × *Gottoiana* × *C. Hardyana*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day). A grand flower of fine shape ; sepals and petals purplish-rose ; lip deep ruby-crimson.

Cypripedium Charlesworthii Bromilowianum (votes, unanimous), from H. J. Bromilow, Esq., Rainhill, Lanes (gr. Mr. Morgan). A true albino, the dorsal sepal being pure white, the rest of the flower pale green without the purplish colour of the type. (Fig. 126.)

Award of Merit.

To *Laelio-Cattleya* × 'Cornelia,' Westonbirt variety (*L. pumila* × *C. labiata*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Flowers equal to those of *C. labiata*, rose with ruby-crimson lip.

Botanical Certificate.

To *Cymbidium Dayanum*, from Messrs. Sander. Foliage slender ; flowers in drooping racemes, white with crimson lines on the petals, and crimson sides to the lip. Syns. *C. Simonsianum* and *C. pulcherrimum*.

To *Megaclinium colubrinum*, from Messrs. Sander. A singular species with flattened purple rachis, bearing on each side a row of small purple flowers.

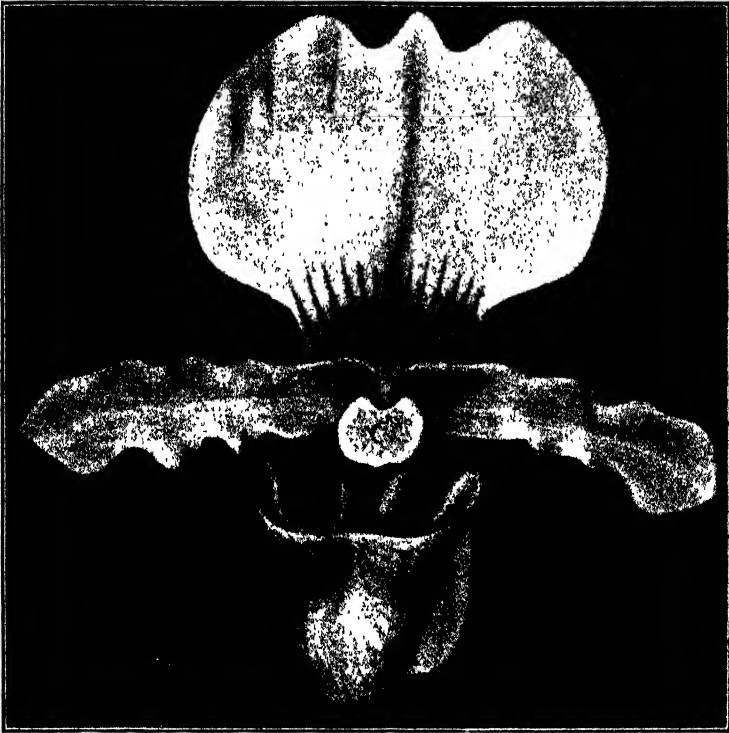


FIG. 126.—*CYPRIPEDIUM CHARLESWORTHII* BROMILOWIANUM.
(*Journal of Horticulture*.)

Other Exhibits.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O. : new hybrids.

C. J. Lucas, Esq. : *Laelio-Cattleya* × 'Dorothy Strachan' (*L. Dayana* × *C. 'Eldorado'*).

Messrs. Heath : *Cypripediums*, *Dendrobiums*, &c.

ORCHID COMMITTEE, OCTOBER 27, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Gold Medal.

To Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt, for a magnificent group composed principally of hybrid *Cattleyas* raised at Westonbirt.

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for hybrids and rare species.

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E. Day), for *Cattleyas*, *Laelio-Cattleyas*, &c.

To Messrs. Hugh Low, Enfield, a group of several white-flowered *Cattleyas*, &c.

To E. Ashton, Esq., The Broadlands, Camden Park, Tunbridge Wells (gr. Mr. Young), for well-grown *Cattleyas*, &c.

Silver Banksian Medal.

To J. S. Moss, Esq., Bishop's Waltham, for a group of *Cattleya Dowiana aurea*.

To Clement Moore, Esq., Hackersach, New Jersey, U.S.A., for cut spikes of white and coloured forms of *Cattleya labiata*.

First-class Certificate.

To *Vanda coerulea Charlesworthii* (votes, unanimous), from Messrs. Charlesworth, Hayward's Heath. A true albino, the flowers being pure white, without a trace of colour. (Fig. 127.)

Award of Merit.

To *Laelio-Cattleya* × 'Lustre' *gigantea* (*C. Luddemanniana* × *L.-C. callistoglossa*) (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Plant dwarf; flower large and of firm substance; sepals and petals white, tinged and mottled with rose; lip large, claret-purple, lighter towards the front.

To *Laelio-Cattleya* × 'Ortrude' *superba* (*L. anceps* × *C. Dowiana aurea*) (votes, unanimous), from Lieut.-Col. G. L. Holford. A showy flower with cream-white sepals and petals, tinged with rose, and ruby-red lip with golden lines from the base.

To *Brasso-Cattleya* × 'Madame Hye' *superba* (*B. Digbyana* × *C. Harrisoniana*) (votes, unanimous), from Lieut.-Col. G. L. Holford. A finely formed flower, white tinged with lilac.

To *Brasso-Cattleya* × *Digbyano-Mossiae* 'Queen Alexandra,' Glen-thorne variety (*B. Digbyana* × *C. Mossiae Wageri*) (votes, unanimous), from Messrs. Wilson, Hayward's Heath. A large pure-white flower of fine shape.

Botanical Certificate.

To *Saccolabium dasypogon*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A dwarf species with short clusters of yellow flowers and white bearded lip.

To *Masdevallia Ortgiesiana*, from Sir Trevor Lawrence, Bart. A tufted plant with flowers an inch long on slender scapes, white with purple stripes.

Other Exhibits.

W. Waters Butler, Esq., Edgbaston: *Cattleya Hardyana alba*, South-fields variety, and *C. labiata*.

Messrs. Cypher: a group.

R. G. Thwaites, Esq. (gr. Mr. Black): hybrid *Cattleyas*.

Mrs. Joad, Worthing: *Renanthera coccinea*.

H. Spicer, Esq. : a group of *Cypripedium Spicerianum*.

Messrs. Stanley : a group.

G. F. Moore, Esq. : *Cypripedium* 'Actaeus Milkmaid.'

Mr. Jensen, Hayward's Heath : *Cattleya Dowiana aurea*.

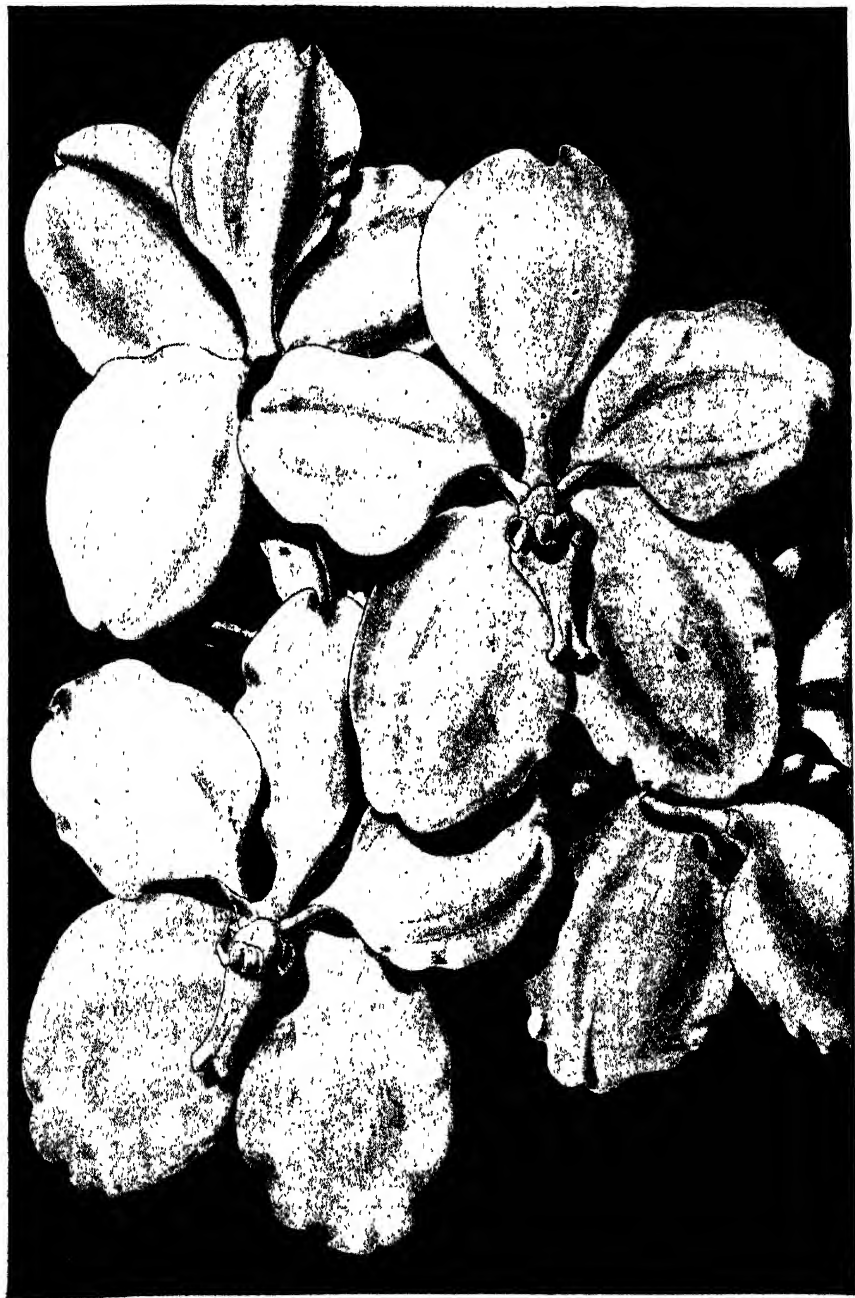


FIG. 127.—VANDA COERULEA VAR. CHARLESWORTHII. (*Gardener's Chronicle*.)

Norman C. Cookson, Esq.: *Calanthe* × 'Angela.'

A. Warburton, Esq.: *Cypripedium insigne excelsis*, resembling *C. insigne* 'Harefield Hall.'

ORCHID COMMITTEE, NOVEMBER 10, 1908.

NORMAN C. COOKSON, Esq., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for a group of hybrid Orchids.

To Messrs. Cypher, Cheltenham, for a group.

To Mr. H. A. Tracy, Twickenham, for a group, including several fine seedling forms of *Cypripedium Spicerianum*.

Silver Banksian Medal.

To Messrs. Hugh Low, for a group.

First-class Certificate.

To *Sophro-Cattleya* × 'Doris' (*S. grandiflora* × *C. Dowiana aurea*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A very fine hybrid of dwarf habit and bearing bright scarlet flowers about three inches across. (Fig. 128.)

Award of Merit.

To *Cypripedium* × 'Dante' *magnificum* ('Hera Euryades' × *Charlesworthii*) (votes, unanimous), from Lieut.-Colonel G. L. Holford, C.I.E, C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Dorsal sepal white blotched with claret-purple; petals and lip honey-yellow tinged with red-brown.

To *Cattleya* × *Clarkiae intensa* (*labiata* × *bicolor*) (votes, unanimous), from Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. J. Hudson). A pretty hybrid, formed like *C.* × 'Iris.' Flowers bright rose with magenta crimson lip.

To *Cattleya* × *Fabia Cooksoniae* (*labiata Cooksoniae* × *Dowiana aurea*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). Flowers formed like *C. labiata*. Sepals and petals white, lip purplish-rose with gold veining from the base.

Botanical Certificate.

To *Bulbophyllum cupreum*, from Sir Trevor Lawrence, Bart, K.C.V.O. (gr. Mr. W. H. White). A strong-growing species allied to *B. Careyannum*, and with copper-yellow flowers.

To *Bulbophyllum lilacinum*, from Sir Trevor Lawrence, Bart. Flowers in dense racemes, white tinged with lilac.

To *Polystachya Laurentii*, from Sir Trevor Lawrence, Bart. A distinct species from the Congo district. Leaves dark green and coriaceous. Flowers in branched terminal spikes; white with yellow crest to the labellum.

To *Maxillaria phoenicanthera*, from Sir Trevor Lawrence, Bart. Allied to *M. punctata*. Flowers numerous, white sparsely spotted with purple.



FIG. 128.—SOPHRO-CATTELEYA × 'DORIS.' (*The Garden.*)

Other Exhibits.

Sir Trevor Lawrence, Bart.: three distinct forms of *Laelio-Cattleya* × *Adolph-Harrisoniana*.

H. S. Goodson, Esq.: a fine specimen of *Cattleya labiata Amesiana*.

Lieut.-Colonel G. L. Holford, C.I.E., C.V.O.: *Laelio-Cattleya* × 'Golden Beauty,' and *Brasso-Cattleya* × 'Mrs. J. Leemann,' Westonbirt variety.

Francis Wellesley, Esq., Westfield, Woking: *Cattleya labiata*, 'Her Majesty the Queen,' a large pure white flower with a faint tinge of pink on the lip; and *C. Gaskelliana* 'Delight,' fine in shape, white with a small rose spot on the lip.

J. Forster Alcock, Esq.: three hybrid *Cypripediums*.

G. P. Walker, Esq.: *Laelio-Cattleya* × 'Hetherwood.'

H. H. Armitage, Esq., Sheffield: *Cattleya Dowiana aurea* × *C. Victoria Regina*.'

W. P. Horton, Esq., Seaford: hybrid *Cypripediums*.

ORCHID COMMITTEE, NOVEMBER 24, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for hybrid *Cypripediums*, &c.

To Messrs. Charlesworth, Hayward's Heath, for *Laelio-Cattleyas*, &c.

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for a group.

To Messrs. Cypher, Cheltenham, for *Cypripediums*.

To Messrs. Heath, Cheltenham, for a group.

First-class Certificate.

To *Cypripedium* × 'Dreadnought' ('Troilus' × *insigne* 'Harefield Hall') (votes, unanimous), from Messrs. Sander, St. Albans. A noble flower, and a great improvement on *C.* × 'Aeson' *giganteum*, which is its nearest ally. Dorsal sepal over three inches wide, gamboge-yellow, spotted with light purple on the lower half, white above; petals and lip pale yellow, tinged and veined with light purple. (Fig. 129.)

To *Vanda coerulea*, var. 'R. Chollet' (votes, unanimous), from Messrs. Sander, St. Albans. A fine round flower, tinged and veined with violet.

Award of Merit.

To *Cypripedium* × 'Arethusa' ('Milo' × *nitens* *Sallierii aureum*) (votes, unanimous), from Lieut.-Colonel G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). A handsome yellow flower, with the upper half of the dorsal sepal pure white, the base being greenish-yellow with rose spots. (Fig. 130.)

To *Odontoglossum* × *Groganiae* (*Edwardii* × *Uro-Skinnersi*) (votes, unanimous), from J. Hubert Grogan, Esq., Slaney Park, Baltinglass, Co. Wicklow, Ireland. Flowers on stout branched spikes, purple with rosy-mauve lip having a yellow crest.



FIG. 129.—CYPRIPEDIUM x 'DREADNOUGHT.' (*Gardeners' Chronicle*.)

(To face page cclx)

Botanical Certificate.

To *Oncidium micropogon*, from Gurney Wilson, Esq., Hayward's Heath. Allied to *O. barbatum*, but distinguished by the large clear yellow petals.

To *Coelogyne fuliginosa*, from Messrs. Armstrong & Brown, Tunbridge Wells. Flowers tawny yellow, with blackish fringed lip.

To *Bulbophyllum Careyanum*, from Messrs. Armstrong & Brown. Flowers red-brown, in dense racemes.



FIG. 130.—CYPRIPEDIUM 'ARETHUSA.' (*Journal of Horticulture.*) (P. cclxviii.)

Cultural Commendation.

To Mr. Bristow, gr. to Mrs. Temple, Leyswood, Groombridge, for a fine specimen of *Coelogyne barbata* with six spikes.

Other Exhibits.

J. Gurney Fowler, Esq. (gr. Mr. J. Davis): *Cymbidium* × 'Maggie Fowler,' and *Cypripedium* × 'Ernest Read.'

Mr. A. Mackellar, The Royal Gardens, Windsor: spikes of *Dendrobium formosum giganteum*.

Lieut.-Colonel G. L. Holford, C.I.E., C.V.O. (gr. Mr. H. G. Alexander) : hybrid *Cypripediums*.

de B. Crawshay, Esq. (gr. Mr. Stables) : a fine form of *Odontoglossum* × *waltoniense*.

F. Bostock, Esq., Northampton : *Cypripedium* × 'Actaeus' *springfieldiense*.

Monsieur Mertens, Ghent : hybrid *Odontoglossums*.

ORCHID COMMITTEE, DECEMBER 8, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, Hayward's Heath, for a group.

To Messrs. Sander, St. Albans, for *Cypripediums* and *Odontoglossums*.

To H. J. Bromilow, Esq., Rainhill (gr. Mr. Morgan), for rare *Cypripediums*.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Cypripediums*.

To Messrs. Cypher, Cheltenham, for a group.

To Messrs. McBean, Cooksbridge, for *Odontoglossums* and *Cypripediums*.

Silver Banksian Medal.

To Messrs. Moore, Rawdon, Leeds, for a group.

To Messrs. Hugh Low, Bush Hill Park, for a group.

First-class Certificate.

To *Brasso-Cattleya* × *Cliftonii* (*B.-C. Digbyano-Mossiae* × *C. Trianaei*, Uplands var.) (votes, unanimous), from Messrs. Charlesworth, Hayward's Heath. Flower formed like *B.-C. × Digbyano-Mossiae*, but much larger, silver-white tinged with lavender, the fringed lip having purple markings at the base.

Award of Merit.

To *Dendrobium Coelogyne striatum* (votes, unanimous), from Mr. H. A. Tracy, Twickenham. Flowers yellow, striped with claret-red ; lip blackish-purple. (Fig. 181.)

Cultural Commendation.

To Mr. Hunter, gr. to his Grace the Duke of Marlborough, for *Vanda coerulea*, with four spikes of flowers.

To Mr. H. Ballantine, gr. to Sir H. Schröder, for *Cypripedium insigne* *Sanderianum* with ten flowers.

Other Exhibits.

His Grace the Duke of Marlborough (gr. Mr. Hunter) : *Cattleya* × 'Fabia,' Blenheim variety, and *C. Trianaei blenheimiensis*.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander) : *Cypripedium insigne*, Holford's variety, and a new *Laelio-Cattleya*.

G. P. Walker, Esq., Putney Heath (gr. Mr. McGregor) : *Odontoglossum laudatum Walkeri* (*Wilokeanum* × *ardentissimum*).

Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins) : *Cypripedium* × 'The Premier' (*C.* 'Mons. de Curte' × *C.* 'Mrs. Wm. Mostyn'), a fine flower of the *C. Beekmanii* class, and *C.* × 'Actaeus Golden Gem,' of a clear greenish-yellow colour, with the upper half of the dorsal sepal white.

J. H. Hill, Esq., Burgess Hill : a group.

Messrs. Heath, Cheltenham : *Cypripediums*.

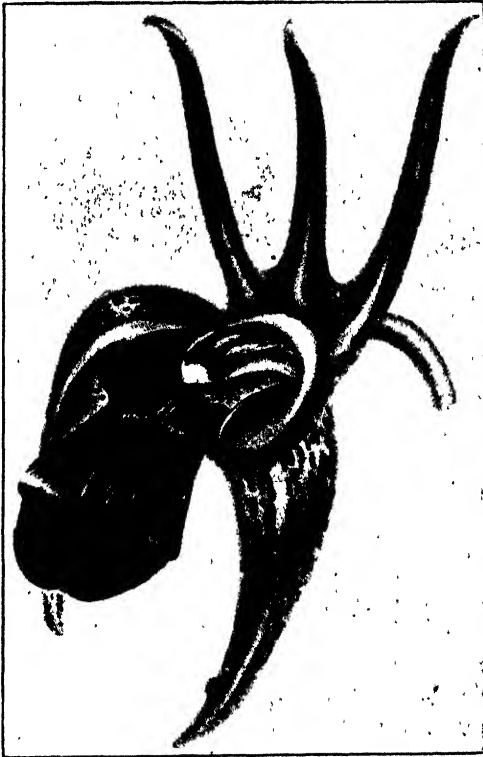


FIG. 181.—*DENDROBIUM COELOGYNE STRIATUM*. (*Journal of Horticulture*.)

J. Gurney Fowler, Esq. (gr. Mr. J. Davis) : *Cypripedium* × 'Actaeus' Fowler's variety.

Hubert Grogan, Esq., Baltinglass : *Odontoglossum* × *Groganiae* (*Edwardii* × *Uro-Skinneri*).

ORCHID COMMITTEE, DECEMBER 22, 1908.

Mr. J. GURNEY FOWLER in the Chair, and twenty-three members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Charlesworth, for a group.

To. F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth), for *Cypripediums* and hybrid *Lycastes*.

To Messrs. McBean, Cooksbridge, for *Odontoglossums*.

Silver Banksian Medal.

To Messrs. Cypher, Cheltenham, for *Cypripediums*.

First-class Certificate.

To *Odontoglossum* × 'Magali Sander' (*Rolfeae* × *Adrianae* 'F. K. Sander') (votes, unanimous). A very large and distinct hybrid with broad segments; flowers white tinged with rose and uniformly blotched with claret.

To *Calanthe* × 'Angela' (*Sedeni burfordiensis* × *Chapmanii*) (votes, unanimous), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. H. J. Chapman). Lip three-lobed, ruby-crimson; sepals and petals of a lighter tint of rose-crimson.

To *Cypripedium* × 'Antinous' ('J. Howes' × 'Actaeus') (votes, unanimous), from Lieut.-Col. G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander). Dorsal sepal white, spotted with purple on the lower half, which is greenish; petals and lip pale yellow, with an obscure green veining.

Award of Merit.

To *Calanthe* × 'Norman' (*vestita gigantea* × *hybrida rubro-oculata*), from Norman C. Cookson, Esq. Sepals and petals rose-purple tipped with white; lip mauve-crimson.

To *Oncidium bicallosum*, Sander's variety (votes, unanimous), from Messrs. Sander. Sepals and petals chestnut brown; lip large, yellow.

Botanical Certificate.

To *Dendrobium elongatum*, from Sir Trevor Lawrence, Bart., K.C.V.O. (gr. Mr. W. H. White). A dwarf species from Annam, with the habit of *D. cymbidioides*. Inflorescence of fifteen flowers, white, the lip having a purple margin and some dark spots.

To *Epidendrum punctiferum*, from Sir Trevor Lawrence, Bart. Resembling a small slender *E. inversum*. Flowers greenish, with purple spots on the lip.

Cultural Commendation.

To Mr. H. G. Alexander, gr. to Lieut.-Col. G. L. Holford, for the rare *Coelogyne Mooreana*, with two spikes.

To Mr. H. J. Chapman, gr. to Norman C. Cookson, Esq., for *Cypripedium* × *Leeanum Clinkaberryanum*, with fifteen flowers.



FIG. 182.—*EPIDENDRUM COSTATUM*. (See p. cxi.) (*Gardeners' Chronicle*.)

Other Exhibits.

Lieut.-Col. G. L. Holford, C.I.E., C.V.O. : several rare Orchids.

Francis Wellesley, Esq. (gr. Mr. Hopkins) : *Cypripedium* × 'Ernest Swinton' (*Godefroyae* × *beechense*).

Sir Trevor Lawrence, Bart. : *Sophro-Laelia* (*S. grandiflora* × *L. Jongheana*).

Messrs. Veitch : *Cypripedium* × 'Thalia' *splendens*.

Messrs. Hugh Low : *Cypripediums*.

Messrs. Armstrong & Brown : *Cypripediums*.

R. G. Thwaites, Esq. : a group of *Cattleya* × 'Maggie Raphael' *delicatissima*.

Monsieur Mertens, Ghent : *Odontoglossums*.

ESTABLISHED
1804.



INCORPORATED
1809.

TELEGRAMS:
"HORTENSIA, LONDON."

TELEPHONE:
5363 WESTMINSTER

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

- | | |
|--|--|
| 1. Temple Show, 1909. | 22. Affiliated Societies' Challenge Cup. |
| 2. General. | 23. Book of Schedules. |
| 3. Letters. | 24. Bottled British Fruits, &c., Show. |
| 4. Telephone and Telegrams. | 25. Colonial-grown Fruit Show, 1909. |
| 5. Journals Wanted. | 26. Shows of kindred Societies in 1909. |
| 6. Subscriptions. | 27. Special Prizes, 1909. |
| 7. Form of Bequest. | 28. Lectures. |
| 8. Privileges of Chemical Analysis. | 29. The Masters Lectures. |
| 9. List of Fellows. | 30. Examinations, 1909. |
| 10. New Fellows. | 31. Examinations Abroad. |
| 11. An Appeal. | 32. Information. |
| 12. Abstracts for Journal. | 33. Inspection of Fellows' Gardens. |
| 13. The Society's Gardens at Wisley. | 34. Affiliation of Local Societies. |
| 14. Trials at Wisley in 1909-10. | 35. Union of Horticultural Mutual Improvement Societies. |
| 15. The Wisley Research Station. | 36. Classification of Daffodils. |
| 16. Students at Wisley. | 37. Colour Chart. |
| 17. Distribution of Surplus Plants. | 38. Monograph on Fungoid Pests. |
| 18. Letting of the Society's Hall. | 39. Rules for Judging, 1909 Code. |
| 19. Exhibitions, Meetings, and Lectures in 1909. | 40. Varieties of Fruits. |
| 20. Error in Fellows' Tickets. | 41. Nicholson Memorial Fund. |
| 21. British-grown Fruit. | 42. Advertisements. |

1. TEMPLE SHOW, 1909.

Fellows are requested to take notice that, in order to meet the requirements of the authorities, considerable alterations in the arrangements for this Show have been made.

Visitors are warned that there will be no refreshments of any sort obtainable at any time except Afternoon Tea from 2 to 6, which will be served out of doors. This is the only alteration affecting visitors.

Exhibitors will find very important changes detailed in "The Book of Schedules," 1909, price 6d., to which they are referred.

2. GENERAL.

Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements; also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much unnecessary correspondence.

3. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

4. TELEPHONE AND TELEGRAMS.

Telephone Number : **WESTMINSTER, 5363.**

"HORTENSIA, LONDON," is sufficient address for telegrams.

5. JOURNALS WANTED.

The Secretary would be greatly obliged by the return to the Society of ANY NUMBERS of the JOURNAL which may be of no further use to Fellows. Complete sets are occasionally applied for, but, at the present moment, not even one can be supplied owing to the stock of the following being exhausted :—

VOLUME X.

VOLUME XIII. Part 1.

These are therefore particularly desired.

6. SUBSCRIPTIONS.

All Subscriptions fall due on January 1st of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments; or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1st. It may be a week or more before the Tickets reach the Fellow, owing to the very large numbers, over 20,000, having to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable

trouble. Forms for the purpose may be obtained from the R.H.S. Offices at Vincent Square, Westminster, S.W. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London and County Bank, Westminster."

7. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ . . . , to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

8. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 74 in the "Book of Arrangements," 1909.

9. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the addresses insufficient, they are requested to inform the Secretary at once. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL and the "Book of Arrangements."

10. NEW FELLOWS.

The President and Council fully appreciate how much the prosperity of the Society and its present large number of Fellows is due to the efforts of Fellows to enlist the sympathy of their friends; and the steady advance during recent years indicates the increasing recognition of the Society's work and usefulness. But it must not be supposed that a maximum has yet been reached. There is ample room for a great increase of Fellows, in the North of England especially, as well as in America and the Colonies.

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

11. AN APPEAL.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially in :—

1. Increasing the number of Fellows.
2. Helping to swell the General Prize Fund started by Mr. A. W. Sutton, V.M.H., for providing Prizes for the Students at Wisley ; and also the special Nicholson Memorial Prize Fund. See page ccxcii.
3. Lectures with lantern slides.
4. Books are required to fill the gaps in the Library both at Vincent Square and at Wisley.
5. New and rare Plants and Seeds are wanted for the Garden and surplus roots for distribution to the Fellows.
6. Assisting in making Abstracts for the JOURNAL.

Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the ways above indicated.

12. ABSTRACTS FOR JOURNAL.

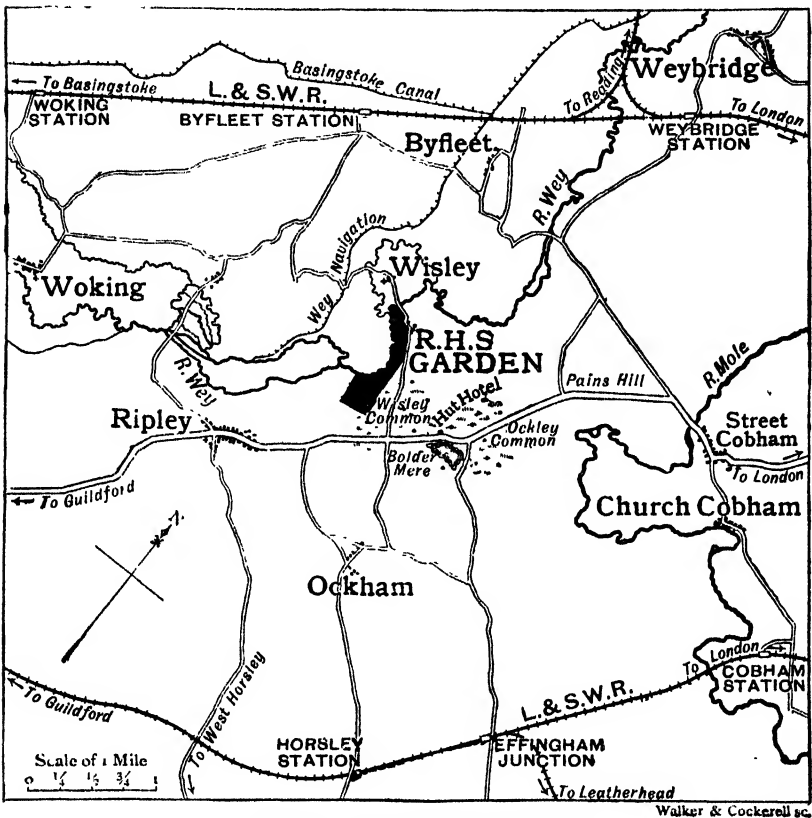
Fellows (especially those who are interested in any of the numerous ways in which modern scientific researches affect Horticulture or Botany) will long ago have recognized the value of the ABSTRACTS from current periodical literature which appear in each issue of the JOURNAL. In order to keep these abstracts up to date, we are greatly in want of a few more volunteers to help in the work. The Periodicals are sent from the office to the Fellow undertaking to Abstract, and the return postage expenses are prepaid. Any Fellow willing to help in this way is requested to send name and address to the Secretary.

13. THE SOCIETY'S GARDENS AT WISLEY

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets from 9 A.M. till sunset, except on Sundays, Good Friday, Christmas Day, and Exhibition days. Each Fellow's ticket admits three to the Gardens. The Public are not admitted.

The Gardens are situated at Wisley, about 2 miles from Ripley in Surrey, and about $8\frac{1}{2}$ miles from Horsley and $5\frac{1}{2}$ miles from Weybridge, both stations on the South-Western Railway, with frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey ; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s. ; or waiting three hours, 10s. ; or to and from Horsley, 7s. ;

Effingham Junction, 7s. ; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr.



POSITION OF THE SOCIETY'S GARDENS

Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

14. TRIALS AT WISLEY IN 1909-10.

Trials of the following Fruits, Flowers, and Vegetables at the Wisley Gardens during 1909 have been arranged.

N.B.—Everything sent for trial *must be named*, and the name and address of the Sender attached.

Fruits.—Autumnal Raspberries. 15 Canes of each variety to be sent at once.

Flowers.—Tree Carnations. 4 plants of each variety to be sent in February, 2 for out-, 2 for in-doors.

Annuals. Seed to be sent in January.

Garden Dahlias, Show and Cactus excluded. 2 plants of each variety to be sent in April.

Early-flowering outdoor Chrysanthemums. 2 plants of each variety to be sent in April.

Pentstemons. 2 plants of each variety to be sent in April or seed in January.

Vegetables.—Potatos, each variety must be labelled as being "early," "mid-season," or "late." 20 tubers of each to be sent by February. Also experiments with one variety—viz. "The Factor" (20 tubers)—secured from as many varying sources as possible, under different soil and climatic conditions. Please send particulars of soil and climate.

Cauliflower. $\frac{1}{4}$ oz. of each variety.

Lettuce. $\frac{1}{4}$ oz. of each variety.

Kidney Beans. $\frac{1}{2}$ pint of each variety.

All parcels should be addressed :—

If sent by post : The Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey.

If by rail : The Superintendent, R.H.S. Gardens, Wisley, Horsley Station, L. & S.-W.R., with advice by post to the Superintendent.

SEEDS SENT FOR TRIAL OTHER THAN THOSE INVITED IN THE ABOVE LIST.

1. Seeds, &c., of plants not included in the Annual Trial List will also be received and grown, as far as possible.

2. The Superintendent is instructed, in the case of all seeds thus sent and grown, to procure seeds of the already best existing similar varieties, and grow them alongside of the newly sent seeds.

3. The resulting plants, &c., will be from time to time (as convenient) submitted to the Committee meeting at Wisley, but the only awards made to such unsolicited plants will be "Commended" and "Highly Commended."

4. Any plants thus grown and tried will have perfect freedom to be retried whenever a regular fixed trial of their congeners takes place, which will, as far as practicable, be at intervals of two or three years.

15. THE WISLEY RESEARCH STATION.

The new Research Station and Laboratory at Wisley is now completed and work is in progress there. Mr. F. J. Chittenden has been appointed Director of the Research Work on Scientific Matters affecting Practical Horticulture, and Lecturer to the Students. By the completion of this station a long-felt want has been met. In the United States, where so much good work has been done in this direction, all is paid for by the Government, but in this country we have to fall back on private individuals or on Societies.

16. STUDENTS AT WISLEY.

The Society admits young men, under 22 years of age, to study Gardening at Wisley. The curriculum now includes not only practical garden work in all the main branches of Horticulture, but also lectures,

demonstrations, and elementary Horticultural Science in the Laboratory, whereby a practical knowledge of simple Garden Chemistry, Biology, &c. may be obtained. The Laboratory is equipped with the best apparatus procurable for Students. The training extends over a period of two years, with a progressive course for each year. Students can only enter at the end of September and at the end of March. Selected Students have also the advantage of attending certain of the Society's Shows and Lectures in London.

17. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematize this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution was established. The great majority also are of necessity *very small*, and may require careful treatment for a time.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive all the plants exactly as he has selected, but when the Ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganised by the sending-out of plants at any later time in the year. All Fellows can participate in the annual distribution *following* their election.

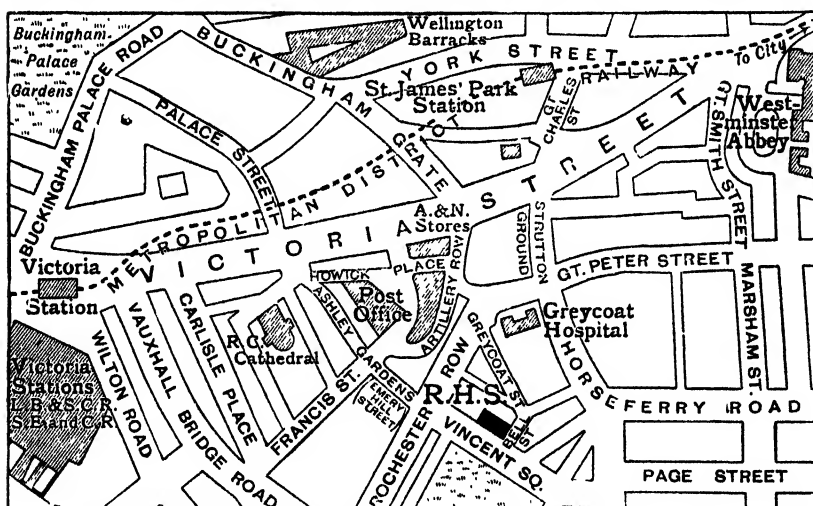
The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form. It is impracticable to send plants by post owing to the lack of Post Office facilities for despatch without prepayment of postage.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

18. LETTING OF THE SOCIETY'S HALL.

The Royal Horticultural Hall and Offices are situated in Vincent Square, which lies straight through Ashley Gardens from Victoria Street,



POSITION OF THE SOCIETY'S HALL.

Westminster, and is about five minutes' walk from the Victoria and St. James's Park Stations.

Fellows are earnestly requested to make known among their friends and among institutions that the ROYAL HORTICULTURAL HALL is available, twelve days in each fortnight, for Meetings, Shows, Exhibitions, Concerts, Conferences, Lectures, Balls, Banquets, Bazaars, Receptions, and other similar purposes. The Hall has a floor surface of 18,000 square feet. It is cool in summer and warm in winter. For a Concert it will seat 1,500, or for a public meeting 1,800. A Sounding Board has been added recently improving the acoustic properties of the Hall greatly. It is undoubtedly the lightest Hall in London. The first floor, consisting

of four rooms, may also be hired for similar purposes, either together or separately. A long-felt want has now been met by the construction of a convenient kitchen in the basement, with lift connections to the eastern annexe and lecture room. For serving luncheons, &c., this will prove a great boon. Ample cloak-rooms for ladies and for gentlemen are available. The regulations, &c., for hiring the Hall are printed in the "Book of Arrangements," and full particulars may be obtained on application to the Secretary R.H.S., Vincent Square, Westminster, S.W., with whom dates may be booked.

19. EXHIBITIONS, MEETINGS, AND LECTURES IN 1909.

The programme will be found in the "Book of Arrangements" for 1909, issued at the end of January. It will be noticed that an Exhibition and Meeting is held practically every fortnight throughout the year, and a short lecture on some subject connected with Horticulture is delivered during the afternoon.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (32) of halfpenny cards *ready addressed* to himself.

20. ERROR IN FELLOWS' TICKETS.

The entry of a Show on December 21 which appears on the Fellows' Tickets is an error. There will be no Show on that date, as it is found to be too near to Christmas.

21. BRITISH-GROWN FRUIT.

In consideration of the facts (1) that the annual Autumn Show of British-grown Fruits is every year practically a repetition of the previous year; (2) that many British-grown fruits cannot be shown in perfection at one Show; and (3) that vegetables have been somewhat neglected, the Council have decided to omit the great Autumn Show for one year, and in 1909 to substitute a series of prizes spread over twelve months, so that every fruit may have a chance of being seen at its best. A schedule of prizes will be found in the "Book of Arrangements" for 1909, and also in "The Book of Schedules," see below.

22. AFFILIATED SOCIETIES' CHALLENGE CUP.

The Council offer a Challenge Cup to be competed for annually by the Affiliated Societies, subject to certain conditions (for which see "The Book of Schedules," 1909, price 6d.). The winners will hold the Cup for one year, and will also receive a Silver-gilt Knightian Medal, together with a set of three Publications and Charts, presented to the Society by the Worshipful Company of Fruiterers.

23. "BOOK OF SCHEDULES."

The 1909 "Book of Schedules," containing revised Rules and Regulations for Exhibitors, &c., and full details of the Temple, Holland House, Colonial Fruit, and Bottled Fruit Shows, and a complete Schedule with Regulations for the Special Fruit and Vegetable Competitions at the Fortnightly Meetings, will be ready for issue on Thursday, February 25, price 6d., on receipt of which a copy will be forwarded by post immediately.

24. BOTTLED BRITISH FRUITS, &c., SHOW.

The Annual Exhibition of British Bottled Fruits will be held on December 1 to 4, 1909. Prizes and Medals are offered. See "Book of Schedules," 1909, to be issued on Thursday, February 25, post free, 6d.

TEMPLE SHOW.

AFTERNOON TEAS will
be served under the Trees.

NO OTHER REFRESHMENTS

whatever will be procurable in the Gardens.

Exhibitors are warned of additional Prizes, and of important additions to the Rules, which will be found in "The Book of Schedules," price 6d.

25. COLONIAL-GROWN FRUIT SHOW, 1909.

An Exhibition of Colonial-grown Fruits and Vegetables will be held on December 1 to 4, 1909.

In holding this Show the Society's sole object is the advancement of the interest of the Colonies (a) by stimulating the production of better fruits; (b) by giving advice in the difficulties confronting Fruit Growers; and (c) by helping to inform the home market. Fruit Growers in the Colonies are asked to assist their own future competition in the markets of Great Britain by sending exhibits to this Exhibition, invitations to which are given to the Colonial and Government Offices, the Embassies, the leading London Fruit Merchants, Colonials on furlough, and others.

Particulars of the Show will be found in the "Book of Schedules" for 1909, to be issued on February 25, price 6d., post free.

26. SHOWS OF KINDRED SOCIETIES IN 1909.

The following dates have been fixed on which R.H.S. Fellows' tickets will admit:—

March 24.—Perpetual Flowering Carnation Society.

April 20.—Auricula and Primula Society.

May 18.—Tulip Society.

July 21.—Carnation and Picotee Society.

July 28.—Sweet Pea Society.

September 16.—Rose Society.

December 8.—Perpetual Flowering Carnation Society.

Copies of the Schedules for these Shows may be obtained from the Honorary Secretary of each Society. For names and addresses see above dates in the "Book of Arrangements," 1909.

27. SPECIAL PRIZES, 1909.

(1) THE SHERWOOD CUP.

Mr. Sherwood, V.M.H., has intimated to the Council that in future the annual Cup which he gives to the Society will be of the value of twenty instead of ten guineas as heretofore. It will be offered at the Temple Show for a group of Orchids, shown by Amateurs (the announcement in the JOURNAL that it was open to the trade was an error)—quality to have more weight than quantity. Ferns and other simple foliage plants may be used for greenery. The Council will add a Cup of lesser value as a second prize if the exhibits are sufficiently meritorious.

(2) ORCHIDS.

The offer of a Veitch Memorial Medal and £5 has been accepted from the Trustees, and will be awarded by the Council at the Temple for a Group of Orchids. In the "Book of Schedules," price 6d., amateur growers will find a series of Orchid Prizes ranging from a group of any size down to one single plant.

(8) OUTDOOR DAFFODILS, APRIL 20.

Messrs. Barr and Sons have presented to the Society a Silver Cup, valued at £7 7s., as a prize for a group of Daffodil blossoms grown entirely outdoors, Polyanthus excluded, Doubles optional, but must include some of each of the other sections, and must contain at least thirty varieties distinct; at least three blooms of each must be shown. Not more than nine blooms of any one variety may be put up. To be staged in bottles, vases, or tubes not exceeding 8 inches in diameter at the top (inside measurement), and all the stems must touch the water. Quality of flower will count more than quantity, and correct naming and tasteful arrangement will be duly considered. Any hardy foliage may be used, Daffodil or otherwise. No prize will be awarded unless

there are three competitors at least. Open to amateurs and gentlemen's gardeners only.

Past winners of this Cup may exhibit, but will not be eligible to receive the Cup more than once in three years. In the event of any such previous winner being adjudged "first," a medal will be awarded instead of the Cup, which will go to the next best exhibit, provided that the judges consider it to be of sufficient merit.

(4) CARNATION PRIZES.

The following Prize has been accepted from the Trustees of the "Veitch Memorial" at the Meeting on April 6, 1909 :—

A Medal and £5 for a group of winter-flowering Carnations (either in pots or as cut flowers, or a combination of both), grown by the exhibitor, and occupying a space of 100 square feet. *Amateurs.*

(5) CHALLENGE CUP FOR AFFILIATED SOCIETIES. (See p. cclxxxiii.)

(6) APPLES AND PEARS.

The Worshipful Company of Fruiterers have presented the following prizes, which the Council have accepted and propose to award as follows :—

On October 12: a set of Publications with Charts and Handbook for the Affiliated Societies. (See p. cclxxxiii and "Book of Schedules.")

November 28: the Company's medals for (a) three dishes of Dessert and six of Cooking Apples, distinct; and for (b) seven dishes of Dessert and two of Cooking Pears, distinct. (See "Book of Schedules.")

(7) HOME-BOTTLED FRUITS.

The Council have accepted the offer of a Mercia Sterilizer from Miss Edith Bradley for award at the Show of Home-bottled Fruits to be held on December 1 to 4, 1909. (See "Book of Schedules," post free, 6d.)

(8) APPLE 'ENCORE,' 1910.

Messrs. Cheal have intimated their willingness to present to the Society a series of seven prizes for a dish of the new Apple 'Encore,' to be awarded at the Great Autumn Show of British-grown Fruits in October 1910. First, 20s.; second, 17s. 6d.; third, 15s.; fourth, 12s. 6d.; fifth, 10s.; sixth, 7s. 6d.; seventh, 5s.

28. LECTURES.

The new Lecture Room is fitted with an electric lantern of the most modern construction; electric current, gas, and water are laid on, and every provision has been made for the illustration and delivery of Lectures.

Any Fellows willing to Lecture, or to communicate Papers on interesting subjects, are requested to communicate with the Secretary.

29. "THE MASTERS LECTURES."

Fellows will remember the intimate connection with the Society of the late Dr. Masters, F.R.S., who did much for horticulture by drawing constant attention to the various ways in which scientific discovery and research might be made serviceable to gardening; and it will also be remembered that a fund was established by subscriptions to perpetuate his memory in connection with the Society and to carry on in some degree his work of science in relation to gardening.

"The Masters Lectures" have accordingly been founded, and the first two are to be given during 1909 by the well-known Professor Hugo de Vries, of Amsterdam, on (a) "Masters' 'Vegetable Teratology,'" Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., in the Chair (June 22), and (b) "The Production of Horticultural Varieties," Professor W. Bateson, F.R.S., V.M.H., in the Chair (September 28).

30. EXAMINATIONS, 1909.

1. The Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 21, 1909. The examination has two divisions, viz. (a) for Candidates of eighteen years of age and over, and (b) for Juniors *under* eighteen years. Candidates should send in their names not later than March 31. Full particulars may be obtained by sending a stamped and directed envelope to the Society's Offices. Copies of the Questions set from 1893 to 1908 (price 2s. post free) may also be obtained from the Office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

The Society is prepared to extend this examination to residents in the Colonies; and, at the request of the Government of the United Provinces of India, arrangements have been made to hold this examination in 1909—altered and adapted to the special requirements of India—at Saharanpur.

In connection with this examination a Scholarship of £25 a year for two years is offered by the Society to be awarded after the 1909 examination to the student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is approved by the Council of the Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

2. The Society will hold an Examination in Cottage Gardening on Wednesday, April 28, 1909. This examination is intended for, and is confined to, Elementary and Technical School Teachers. It is

undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test of such competence. The general conduct of this examination will be on similar lines to that of the more general examination. Questions on Elementary Chemistry and Biology are now added to this examination.

8. The Society will hold an examination in the Royal Horticultural Hall, Vincent Square, S.W., on Monday, January 10, 1910, for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. The entries close on January 1, 1910.

Medals and Certificates are awarded and Class Lists published in connection with these examinations, and the Syllabus may be obtained on application to the Secretary R.H.S., Vincent Square.

31. EXAMINATIONS ABROAD.

On the invitation of the Government of the United Provinces of India, the "General Examination" in the Principles of Horticulture is to be slightly modified so as to fulfil their local requirements, and a first examination will be held in April 1909 at Saharanpur. This suggests that possibly other countries and districts may feel it desirable to enter candidates for a similarly modified examination, in which case the Council would doubtless be prepared to organize it.

The examiners are leading horticulturists in England, and for examinations abroad they will be assisted by experts acquainted with the special horticultural conditions of the various countries desiring to adopt the Society's tests.

32. INFORMATION.

Fellows may obtain information and advice from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary R.H.S., Vincent Square, Westminster, S.W. Where at all practicable, it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings so as to be laid before the Scientific or other Committees at once.

33. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. a fee of £8 8s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their gardens. Gardens can only be inspected at the *written* request of the owner.

34. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of local Horticultural Societies by a scheme of affiliation to the R.H.S. Since this was initiated, no fewer than 200 Societies have joined our ranks, and the number is steadily increasing.

The Parent Society is this year offering a Silver Challenge Cup to be competed for by Affiliated Societies. (See "Book of Schedules," price 6*d.*, under date October 12.)

To the privileges of Affiliated Societies have been added all the benefits accruing under the scheme recently introduced for the Union of Horticultural Mutual Improvement Societies.

Secretaries of Affiliated Societies can obtain on application a specimen of a Card which the Council have prepared for the use of Affiliated Societies for Certificates, Commendations, &c. Price 8*s.* 6*d.* for 10 copies, 5*s.* 6*d.* for 20, 11*s.* 6*d.* for 50, 20*s.* for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5*s.* 6*d.*, with case complete; Silver, 12*s.* 6*d.*, with case complete; Silver-gilt, 16*s.* 6*d.*, with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered—price 6*d.* each.

35. UNION OF HORTICULTURAL MUTUAL IMPROVEMENT SOCIETIES.

This Union has been established for the encouragement and assistance of Horticultural Mutual Improvement Societies, the object being to strengthen existing Societies, to promote interchange of lecturers, to provide printed lectures, and if possible to increase the number of these useful Societies.

A list of lecturers and their subjects, and also a list of typewritten lectures, with or without lantern slides, prepared by the Society, may be obtained from the Secretary R.H.S., price 8*d.*

The Secretary will be glad to hear from lecturers who are willing to lecture to such Societies that he may enroll them in the Register of Lecturers and bring them into touch with Societies requiring assistance. Others may like to send to him written lectures (with or without lantern slides) that he may have them printed for circulation among these Societies.

Lantern slides on horticultural topics are urgently needed, and their gift will be very much appreciated.

36. CLASSIFICATION OF DAFFODILS.

At the request of Daffodil Growers the Council recently appointed a Committee to consider the best way of avoiding the confusion, and consequent disputes, likely to arise from the recent multitudinous

crossing, recrossing, and intercrossing of the old Divisions of Magni-, Medio-, and Parvi-coronati. The Committee have delivered their Report instituting an entirely new system of classification, which the Council have adopted, and ordered to be used at all the Society's Shows. The Report contains a list of every Daffodil known to the Committee, together with the name of the raiser as far as it could be discovered, each flower known being allotted to its appropriate class. The Report has been printed in a handy book form, and can be obtained from the Society's Office, Vincent Square, at a cost of 1s.

37. COLOUR CHART.

Hardly a gardener or florist exists who has not at times longed for a COLOUR CHART—that is to say, for a standard of reference whereby he could himself name, or recognize, or convey to a friend at a distance, the *exact* shade of colour of a flower he desired to procure or had seen advertised, or wished to commend to a friend. Take, for example, the word “crimson”; what a multitude of colours and shades it may be made to include! Some, very beautiful; some, horrible concoctions of red and blue crudely combined.

The Council of the Society have long felt the need of such a Colour Chart, but the huge expense of producing it has hitherto deterred them from issuing it.

Not long since an admirable chart, containing more than 1,450 shades of colour between white and black, was published at the instance of the French Chrysanthemum Society, the price being £1 1s. net, and by it it is now possible to *exactly* recognize or describe to a friend or purchaser at a distance the precise colour of any possible flower. You may have met with an Azalea, for instance, which greatly strikes your fancy; you take out your chart and match its shade, and describe it to your friend or your nurseryman as, “Colour: Apricot, p. 53, shade 3,” and he turns to his chart and sees *exactly* what it is you want or describe. Or you want to make someone understand the exact shade of a rose in the way of “Andersoni,” and you need only say, “Rosy pink, p. 118, shade 4,” and your correspondent turns to his chart and sees in a moment exactly what it is you want to describe. Or a nurseryman, having raised a new variety, can by simply quoting “Colour Chart, p. —, shade —,” exactly represent to his customers the colour-beauty of his new introduction.

The Council recognizing both the excellence and the usefulness of this chart, the idea at once occurred: Could it not be adopted as an International Standard, so that all lovers of flowers all over the world could accurately and exactly describe to one another (no matter how far away or speaking what language) the colour and shade of any particular flower they refer to? There seemed no other difficulty than the somewhat prohibitive cost of £1 1s. net. But difficulties only exist to be overcome, and by undertaking to be responsible for a very large number, the Society is now in a position to offer this Chart to its Fellows at the reduced cost of 14s. 6d., for which price it can be obtained at the Society's Offices, Vincent Square, or it can be sent free by post for 15s.; but in all cases a cheque or postal order must be sent beforehand.

This Chart will, of course, be found vastly useful for many other purposes; for example, a lady wishing to match a certain shade has only to refer her dressmaker to such and such a colour on p. —, shade —, and it can be infallibly matched. An artist wishing to describe the colour of the sky on a certain sundown can do so exactly by reference to the chart. And in many other like ways it must prove generally useful, containing as it does every possible shade of colour between black and white.

The Council hope that Fellows will avail themselves freely of this offer, as unless a very large number of copies are purchased a great loss will accrue to the Society.

38. MONOGRAPH ON FUNGOID PESTS.

The attention of Fellows is directed to a handsome volume published by the Society on Fungoid Pests of Cultivated Plants, by Dr. M. C. Cooke, V.M.H. It consists of 280 pages of letterpress, and is illustrated with 24 coloured plates, containing figures of 360 different fungoid attacks, and 23 woodcuts. It also contains a Chapter on Fungicides, which explains clearly how to make the different washes and sprays, and gives the proportions in which the various ingredients should be used. The whole work is written so as to interest and instruct the cultivator in the simplest and most practical manner. The volume makes an admirable school prize or gift to a gardener or student of nature. Price 5s., R.H.S. Office, Vincent Square.

"No one whose plants are subject to fungoid attacks—and whose are not?—should be without this book; for not only can they by its use identify the disease at once, but they are also told both how to treat it and overcome it, and also how to make the different washes and sprays which the different classes of fungoid attacks require."

39. RULES FOR JUDGING—1909 CODE.

The "Rules for Judging, with Suggestions to Schedule Makers and Exhibitors," have again been further revised and considerably modified from the experience gained during the last few years. Special attention is drawn to the amended Rule defining "an amateur," with suggestions for establishing four distinct classes of amateurs to meet the requirements of larger or smaller local Societies. The "pointing" recommended for fruits and vegetables has also been considerably amended, and the terms "annuals and biennials" further explained. The secretaries of local Societies are advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d. addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

40. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues, whilst for an expenditure of 2d. they can obtain from the Society a little

16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the newer varieties of Fruits, which promise well, but are not yet sufficiently proved to be recommended for general planting.

Copies of this pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2d., or 25, 2s.; 50, 8s.; 100, 4s.

41. NICHOLSON MEMORIAL FUND.

The Council have been requested to raise a fund for the establishment of a permanent memorial of the late Mr. Geo. Nicholson, V.M.H., F.L.S. With this they most cordially agree. There are few, if any, men to whom the present generation of gardeners owes a deeper obligation than to the author of "The Dictionary of Gardening," a work which "has done more towards the standardization of plant names and developing an interest in horticulture than anything published since Loudon," 1829.

Mr. Nicholson was for many years a most valued member of the Scientific Committee of our Society. He also took a very active part and keen interest in the re-establishment of examinations by the Society, and himself acted as one of the examiners. It is in view of this last point and after carefully estimating the amount likely to be subscribed, that the Council propose to establish a "Nicholson Prize," to be awarded annually to the students at Wisley.

Subscriptions should be sent addressed "The Nicholson Prize Fund, R.H.S. Office, Vincent Square, London," and cheques and postal orders made payable to "The Royal Horticultural Society," crossed "London and County Bank." A list of the subscribers will be published later, but without the actual amount sent by each.

42. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

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